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Environmentally Friendly Cleaners for Removing Tar from Metal Surfaces

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Abstract: As part of its mission, the Sustainable Painting Operations for the Total Army (SPOTA) working group evaluated solvents that will not impact the environment while cleaning armament equipment, in particular ground vehicles. ERDC-CERL researchers, in support of the SPOTA program, were tasked with conducting a preliminary study and develop a methodology to evaluate environmentally friendly cleaners that would be effective in cleaning road tar on military vehicles. The study involved an extensive literature review of commercial environmentally friendly tar removers (both products and methodologies). Twenty six commercial tar removal products were identified as possible solvents for removing the tar stains from ground vehicles. In addition, laboratory coupon evaluations were conducted using three select commercial products. This report presents the results of the search for commercial tar removal solvent systems, and a laboratory evaluation of select solvent systems for removing tar from steel coupons.

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Preface

This study was conducted for the Army Research Laboratory (ARL) under "Sustainable Painting Operations for the Total Army (SPOTA) program." ERDC-CERL conducted the study under a reimbursable work order (MIPR8DDBPBW160). The technical monitor was Mr. Wayne Ziegler, Army Research Laboratory.

The work was managed and executed by the Environmental Processes Branch (CN-E) of the Environmental Division (CN), Engineer Research and Development Center/Construction Engineering Research Laboratory (ERDC/CERL). The CERL investigators were Dr. Veera Boddu and Joyce Baird. Deborah Curtin is Chief, CEERD-CN-E, and Dr. John Bandy is Chief, CEERD-CN. The associated Technical Director was Dr. William Severinghaus, CEERD-CV-T. The Director of ERDC-CERL is Dr. Ilker R. Adiguzel.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL Gary E. Johnston, and the Director of ERDC is Dr. James R. Houston.

1 Introduction

Background

One of the main objectives of the Sustainable Painting Operations for the Total Army (SPOTA) Program is to implement Hazardous Air Pollutants (HAP) free and compliant surface coating materials in surface treatment and protection of Defense Land Systems and Miscellaneous Equipment (DLSME) while meeting the National Emissions Standard for Hazardous Air Pollutants (NESHAP) regulations. The SPOTA Program's mission is to guarantee continued operations at Army facilities, regardless of the institution of new NESHAP regulations throughout the Department of Defense (DOD) and industrial community. To realize the objectives, SPOTA would develop or provide alternatives, while maintaining combat readiness for thrust areas; coordinate with affected sites and all end users; and concurrently work with the U.S. Environmental Protection Agency (USEPA).

As part of the SPOTA mission ERDC-CERL researchers are tasked to investigate environmentally friendly cleaners and processes for removing road tar/asphalt from Army ground vehicles. It is a standard practice at Army facilities to remove tar from ground vehicles during general maintenance and repainting of any ground vehicle. Currently, the preferred Army practice to remove tar is to use 40,000 pounds per square inch (psi) waterjet. Vehicles are washed using wash racks, waterjets, hand wipes, and limited chemical usage, in heated sheds. Commercial products such as Bio Pro (from Biosystems, Inc.) and Teksol (from Inland Technologies, Inc.) are also used. The requirements include the use of solvents compatible with wastewater treatment plants that handle phosphate type solutions.

The terms used by commercial vendors such as environmentally friendly, all natural, green, and nontoxic, when associated with cleaners or degreasers, are generic, qualitative and may be misleading to the end user. Some suggestions to help the consumer in selecting products that are effective and will not be detrimental to the environment are included in the article "Six Sins of Greenwashing™" (TerraChoice Environmental Marketing, Inc. 2007). The article identifies some uncertainties as: Hidden Tradeoff, No Proof, Vagueness, Irrelevance, Fibbing, and Lesser of Two Evils. The Hid-

den Tradeoff is based on one environmental attribute and ignores other more important environmental issues. Often the supporting evidence is not available or that the claims cannot be substantiated. To avoid these uncertainties or problems, a critical review of the vendor information and/or field testing is required.

Approach

An extensive search was conducted for commercial environmentally friendly cleaners that would remove tar from metal surfaces. These commercial cleaners were carefully reviewed and ranked based on scientific criteria. Three of these cleaners were selected and laboratory tested for their cleaning efficiency and validation. Based on this literature review and experimental study, a test protocol and a guidance document for selecting a cleaner for removal of tar/asphalt from ground vehicles was developed.

Objectives

The objective of the study was to provide recommendations on the selection of commercially available, environmentally friendly cleaners for removing road tar/asphalt from Army ground vehicles.

Mode of technology transfer

The results will be presented at a Joint Services Environmental Management (JSEM) Conference. And an ERDC-CERL Technical Report will be published and it will also be accessible through the World Wide Web (WWW) URL: http://www.cecer.army.mil

2 Properties of Asphalt

Information on thermophysical properties of tar and asphalt are important for its removal when it is stuck to surfaces. The raw material used in most modern asphalt manufacturing is petroleum. This is a naturally occurring liquid bitumen, a mixture of black, sticky, viscous organic liquids that are entirely soluble in carbon disulfide and composed primarily of highly condensed polycyclic aromatic hydrocarbons. Crude bitumen must be heated or diluted before it will flow. Refined bitumen is the residual (bottom) fraction resulting from fractional distillation of petroleum during refining process. It is the heaviest fraction with the highest boiling point of 525 °C (977 °F) (WAPA 2003).

Chemical composition and properties of bitumen

Bitumen consists of polar and nonpolar compounds, and the interactions of the polar compounds determine its mechanical properties. Two main parameters govern the chemistry of bitumen: the crude source and the manufacturing process. Table 1 lists an elemental analysis of several asphalts. Asphalts are mainly carbon and hydrogen, but most of the molecules contain at least one hetero (S, N, O) atom (Holleran et al. 2005). The general types of molecules in bitumen include: hexane (C_6H_{14}), cyclohexane (C_6H_{12}), and benzene (C_6H_6) (Holleran et al. 2005). Molecular weights of constituent compounds vary from hundreds to many thousands. The compounds are classified as asphaltenes (high molecular weight and insoluble in hexane or heptane) or maltenes (lower molecular weight and soluble in hexane and heptane). Asphalts usually contain from 5 to 25 percent by weight of asphaltenes (Freemantle 1999).

Table 1. Elemental analysis of select bitumen (Holleran et al. 2005).

Element	Weight percent otherwise as mentioned*			
	Mexican	Arkansas	Boscan (Venezuela)	California
Carbon (C)	83.77	85.78	82.9	86.77
Hydrogen (H)	9.91	10.19	10.45	10.94
Nitrogen (N)	0.28	0.26	0.78	1.10
Sulfur (S)	5.25	3.41	5.43	0.99
Oxygen (O)	0.77	0.36	0.29	0.20
Vanadium (V)	180 ppm	7 ppm	1,380 ppm	4 ppm
Nickel (Ni)	22 ppm	0.4 ppm	109 ppm	6 ppm
* ppm = parts per million by weight				

Physical properties of asphalt

The most important physical properties of asphalt are:

- *Durability*. This is a measure of the amount an asphalt binder changes over time. As the asphalt binder ages, the viscosity increases and it becomes stiff and brittle.
- *Rheology*. This is the study of deformation and the flow of matter. Hot Mix Asphalt (HMA) pavements that deform and flow too much may have a tendency toward rutting and bleeding, whereas those that are too stiff may be prone to fatigue cracking.
- *Safety*. Asphalt volatilizes when heated. At very high temperatures (well above those used in the manufacture and construction of HMA) the asphalt cement may release enough vapor so that the volatile concentration immediately above the asphalt may ignite if exposed to a spark or open flame. This is the flash point, which is tested and controlled for asphalt in cement applications.
- *Purity*. Asphalt as used in HMA paving should use almost pure bitumen, as impurities may undermine asphalt performance (WAPA Asphalt Pavement Guide 2002).

Table 2 summarizes the physical properties of a typical asphalt from the Material Safety Data Sheet (MSDS) for Marathon Petroleum Asphalt (http://www.mapllc.com/MSDS/).

Table 2. Summary of physical properties marathon petroleum asphalt.

Property	Value*
Appearance	Black-brown solid or semi-solid
Physical State	Liquid
Substance Type (Pure/Mixture)	Mixture
Color	Black-Brown
Odor	Tar
pH	Neutral
Boiling Point/Range (5-95%)	>700 F
Melting Point/Range	115-199 F
Specific Gravity	0.95-1.13
Density	7.9-9.4 lbs/gal
* Derived from the MSDS for Marathon Petroleum Asphalt.	

Forms of asphalt used in paving

- Asphalt (already mentioned above) is prepared for use in HMA and other paving applications.
- Emulsified asphalt consists of a suspension of small asphalt cement globules in water, assisted by an emulsifying agent (e.g., soap). Emulsions have lower viscosities than neat asphalts and can be used in low temperature applications. After applying the emulsion, the water evaporates and leaves the asphalt cement.
- Cutback asphalt is a combination of asphalt cement and petroleum solvent. These also have lower viscosities than neat asphalt and can be used in low temperatures. When the solvent evaporates, the asphalt cement remains.
- Foamed asphalt is a combination of hot asphalt binder and small amounts of water. The cold water turns to steam when it comes in contact with the hot asphalt binder. The steam becomes trapped in tiny asphalt binder bubbles, resulting in high volume asphalt foam. The foam lasts only a few minutes and then the asphalt binder resumes its original properties. Foamed asphalt is used as a binder in soil or base course stabilization (WAPA Asphalt Pavement Guide 2002).

The following information was included as a guide in the selection of suitable commercially available solvents for removing tar from Army ground vehicles. Due to environmental protection requirements, most state and Federal agencies are now required to use biodegradable solvents instead of diesel fuel or other hydrocarbon solvents.

3 Summary of Commercial Tar Removers

Under the SPOTA program, the Army is leading an effort to develop and demonstrate pollution prevention technologies to reduce hazardous air pollutants and other volatile organic emissions at surface cleaning and painting operations at DOD facilities. This effort focuses on evaluation of solvents for removal of tar from ground vehicle surfaces. Rhee et. al (1995)conducted a survey of DOD facilities, and listed some desired general properties of cleaning solvents (Table 1), which also provide guidance for identifying a cleaner for application to surfaces of tactical and transport vehicles. The general guidance was considered while developing this report's recommendations for solvents and methods to remove tar from metal surfaces prior to painting and as part of general maintenance.

The following criteria were considered for selecting a solvent for removing tar from vehicle surfaces:

1. Effectiveness in removing the tar and fast drying
2. Shall have low VOCs
3. Shall have no or low content of HAPs
4. Shall have low toxicity
5. Shall have high flash point
6. Shall have low flammability
7. The ability to recycle the solvent
8. The cleaner residues must be biodegradable and easily treatable along with regular wastewater streams
9. Material compatibility, use of the solvent should not lead to corrosion or erosion, if possible provide corrosion protection layer,
10. The cost of the solvent and the solvent requirement should be minimal.

Before establishing the criteria for selection of solvents, the following information regarding current practice to remove tar was also obtained from the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC). The currently practiced method uses a 40,000 psi waterjet to mechanically remove tar. Other commercial formulations such as Biopro and Teskol from Inland Technologies are used for spot cleaning. The tar removal is done prior to regular maintenance and re-induction of any vehicle. Currently visual inspection and sometimes accompanied by a

water-break test are the only methods of evaluating the cleanliness of the tar removal step.

A literature survey of commercially available solvents was performed. The intention was to select solvents that were free from hazardous chemicals and hence safe for users, and that leftover waste that could be disposed of simply. Table 3 includes the results of the survey. Appendix A to this report lists additional information on these tar-removing solvent systems. The Material Safety Data Sheets (MSDSs) and properties of each solvent (included in Appendix B) were reviewed. Table 3 includes the chemical composition of the solvents.

Table 3. Commercial tar removing solvents.

#	Company	Product	Chemical composition	Application
1	Beaver Research 3700 W. Kilgore Rd. Portage, Michigan 49002 Toll Free: 800.544.0133 Phone: 269.382.0133 Fax: 269.382.0214 email: sales@beaverresearch.com	57A Degreaser	Diethanolamine, Aliphatic (D-60) Solvent Naphtha, Medium	Removes tar from metal parts.
2	Biochem systems BioChem Systems 3511 N. Ohio Wichita, KS 67219 (316) 838-4739 (800) 777-7870 http://www.biochemsys.com/service.html	Bio T Max	D-limonene	Cleans asphalt/tar from metal parts.
3	BioSystems, Inc. P.O. Box 464 Fort Collins CO 80522-0464 (800) 224-4605 info@biosystemsinc.com	BioPro	D-limone Nonionic surfacant	Removes tar & asphalt.
4	Chemco Industries 5731 Manchester Ave., St. Louis, MO 63110 info@ChemcoCorp. com	TarvaSol	D-lemonine	Removes tar & asphalt from metal surfaces.
5	CleanLine Products, Inc. PO Box 625 Canton TX 75103 1-888-536-5185 Fax: 903-567-4600 info@cleanlineproducts.com	Citrus Blast	Isoparaffins	Cleans off tar.
6	Coastwide Labs www.coastwidelabs.com 1-800-775-3289	Orange Waterless	Nonionic Surfactant, Beta-Pinene, Citrus Distillate	Removes road tar from vehicles.
7	Cogent Environmental Solutions 13 Adrian Ave., Mansfield, Ontario Canada L0N 1M0 Tel: (705)-434-4489 / Fax: (705)-434-9675 / Toll-Free: 1-877-994-9908 E-mail: cogentenvironmental@ecogent.ca	EcoGent Universal Cleaner	2-Hydroxypropanoic acid, Alkyl polyglycoside Glucopyranose, oligomeric, decyl octyl glycosides	Car cleaner removes tar.

#	Company	Product	Chemical composition	Application
8	Delco Cleaning Systems of Fort Worth 2513 Warfield Street, Fort Worth, Texas 76106-7554 Phone: 800-433-2113, 817-625-4213, Fax: 817-625-2059 mailto:delco@dcs1.com, http://www.dcs1.com/	R-109	Mineral Spirits, D-Limonene	Removes asphalt & tar from trucks.
9	EaCo Chem. Inc. 765 Commerce Avenue New Castle, PA 16101 1-800-313-8505 Fax: (724) 656-0757 info@eacochem.com	C-Tar Melt	Petroleum Hydrocarbon, Ethylene glycol n-butyl ether	Safe for wood, metal, masonry
10	EcoLink – Corporate Headquarters 2177-A Flintstone Drive Tucker, GA 30084 800-886-8240 770 621 8240 770 621 8245 fax email info@ecolink.com	Electron	Citrus Terpene	Solvent degreaser.
11	Inland Technologies 401 East 27th Street Tacoma, WA 98421 inland@inladtech.com	Teksol EP	Hydrotreated heavy naptha/ C10-C11 Paraffinic hydrocarbons	Cleans aerospace and electronic Components.
12	KleenAll Toll Free: (800) 537-9545 Office: (718) 748-1550 Fax: (718) 748-3425 General Information Email: info@kleenallplus.com	#408 Tar & Asphalt Remover #141 Vehicle wash	Petroleum naphtha, Ethylene Glycol Methyl Ether, Dipropylene Glycol Methyl Ether, Anhydrous Sodium Hydroxide Triethancamine (listed in FL, IL, MA, NJ, PA, RI)	Cleans tar from road machinery.
13	Momar 1830 Ellsworth Industrial Dr. Atlanta, GA 30318 404-355-4580	Agri-sol	Methyl Ester Soybean Oil Ethyl Lactate, Methyl Ester Soy-bean Oil	Tar, grease & asphalt remover
14	Momar 1830 Ellsworth Industrial Dr. Atlanta, GA 30318 404-355-4580	Vega-sol	Ethyl lactate Methyl ester soybean oil	Tar, grease & asphalt remover
15	Ostrem Chemical Co. 2310-80 Ave Edmonton AB T6P 1N2, Canada (780) 440-1911	T-300 Tar Remover	Petroleum Distillates, Ethylene Glycol Monobutyl-Ether	Removes tar from vehicles.
16	Petroferm, Inc. 2416 Lynndale Road · Fernandina Beach, Florida 32034 904-261-8286 FAX: 904-261-6994	Axarel® 32	Mixed aliphatic hydrocarbons Diisobutyl dibasic acid ester mix-ture diisobutyl glutarate diisobutyl adipate diisobutyl succinate Alkyloxy polyethylene oxyethanol	
17	Schaeffer Manufacturing Co. Eau Galle, Wisconsin 715-283-4031 4molyoil@wwt.net	#739 Citrol II	Monocyclic Terpene	Removes road tar from vehicles.
18	Selden Research Ltd Staden Business Park Staden Lane Buxton, Derbyshire SK17 9RZ Tel : 01298 26226 sales@selden.co.uk	Tar n' Glue Remover	1,2,4-Trimethylbenzene, Alcohol Ethoxylate Anionic Detergent, Xylene-ortho Solvent, Light aromatic, Naphtha (petroleum)	Removes tar from metal surfaces.
19	Sentinel Products, Inc. 51 NE 77th Ave Minneapolis, MN 55432 800-373-0633 Fax 763-571-1819	Sentinel 700	Refined Petroleum Solvents Ethylene Glycol Monobutyl Ether	Removes tar & asphalt from met-als.

#	Company	Product	Chemical composition	Application
20	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYsolve Industrial Strength	Mixed fatty & methyl esters Linoleic, Oleic, Palmitic, Linolenic, Stearic, Palmitoleic Erui	Removes tar & asphalt.
21	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYsolve II	Mixed Fatty Acids Methyl esters	Removes tar & asphalt.
22	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYsolve II Plus	Ethyl lactate Methyl soyate	Removes tar & asphalt.
23	SSPEnviro Safety Short Production, Inc Environmental Division 950 Gemini, Suite 1 Houston TX 77058 1-800-458-2236 Fax 281-956-1000	GoldSolv	Organic Solvent	Removes asphalt/tar from equipment.
24	United Labs Canadian Headquarters United Laboratories of Canada 214 Dolomite Drive Toronto, ON M3J 2N2 (800) 323-2594 sales@unitedlabsinc.ca	United 399	d-1,8(9)-p-menthadiene	Non-emulsifiable tar remover.
25	Walter Surface Technologies J. Walter Inc. 810 Day Hill Road Windsor, CT 06095 (800) 522-0321 Fax: (860) 560-7300	Bio Clean	Orange terpenes, Ethyl lacatate	Removes tar Universal cleaner
26	Walter Surface Technologies J. Walter Inc. 810 Day Hill Road Windsor, CT 06095 (800) 522-0321 Fax: (860) 560-7300	X-Force (L-74E)	No hazardous substances	Removes tar.

4 Review of Experimental Protocols for Evaluation of Tar Removers from Metal Surfaces

Introduction

Laboratory standard testing protocols available in literature for tar removal from metal surfaces were reviewed. Search was conducted on multiple databases comprising of Scopus, Academic Search Premier (Ebsco), Academic Onefile (Gale), Web of Science-including Social Sciences, Medicine, Humanities, and Engineering. The most pertinent results are listed in the following section. Tar removal experiments were designed and conducted using a total of three commercial solvents. The three solvents were tested on metal coupons simulating the metal surfaces of military tactical and transport vehicles.

Literature review of solvents and processes

Kulkarni et al. (2003) found a variety of environmentally friendly and safe asphalt-removing solvents available in the market. However, they noted there is no quantitative standardized procedure to compare the efficacy of these solvents. Their goal was to develop a standardized procedure that would yield quantitative and repeatable results. After evaluating various alternatives like metal and glass plates, ceramic tiles, and aluminum foils, the aluminum dish was found most suitable for the study. Test results obtained for solvent comparison were found to be consistent and repeatable, with the coefficient of variation for asphalt removed less than 10 percent for most solvents. Further, this study provides an outline for cost-effective analysis of solvents used in relation to diesel fuel, and the procedure can also rank solvents quantitatively. Sacco (2004) has studied the blending of two plant-derived solvents to clean asphalt from trucks, shovels, and other equipment used to handle paving operations. One of the solvents was ethyl lactate, made from ethanol and lactic acid made by fermenting corn sugars. The other was methyl soyate, a mixture of methyl esters of the fatty acids found in triglycerides from soybean oil. The new solvent, called Agri-Solve, cleans without leaving a residue and proved to perform better than diesel fuel and several other solvents currently used for the job. Bryant and

Cannon (1996) have found a substitute, 3 percent hydrogen peroxide (H_2O_2) to effectively clean tenacious residues off glass surfaces. They evaluated the solvent both at moderately elevated pH conditions and iron-based catalysts. Results revealed that 100 percent of an asphalt residue could be removed from glass surfaces within 105 min when it was submerged in a 3 percent H_2O_2 solution at pH 9.5 and ambient temperature. Furthermore, the asphalt residue could be completely removed within 45-60 min if the H_2O_2 solution also included 10^{-3} M $FeCl_3$.

Lahib (2003) also found 3 percent hydrogen peroxide H_2O_2 in water effectively removed residues from glass surfaces. To simulate industrial cleaning conditions, asphalt was employed as a representative surrogate for tough-to-clean residues. Asphalt cleaning was dramatically enhanced by mild heating: whereas 3 percent H_2O_2 at pH 9.5 and 23°C removed 100 percent of a fresh asphalt residue within 60 minutes, heating to 53°C. achieved full removal within 2 minutes. As asphalt became aged or dried by exposure to air, longer cleaning durations were required. Nevertheless, all of the asphalt could still be removed with 3 percent H_2O_2 at pH 9.5 and 70° C. within 2 to 60 minutes, even after the asphalt had dried onto glass for a week. H_2O_2 removed asphalt even when visible light was not present. When the H_2O_2 was excluded, a pH 9.5 bath at 70°C removed only a small fraction of this asphalt, if any.

The IceMaster process (Kipp 2007) has penetrated many areas of industry where coatings must be gently removed from surfaces. In the IceMaster process a mixed stream of dry ice particles and compressed air is emitted from a nozzle on to the surface being cleaned. The strong refrigeration effect of the dry ice embrittles materials such as oils, waxes, greases, paints, and bitumens. The coating cracks and the dry ice particles convert to carbon dioxide gas and leave. The surfaces themselves being cleaned are not attacked or embrittled by the cold. Therefore, it is not necessary to remove seals and rubber parts when using IceMaster process. After cleaning, only residues of the coatings have to be removed. To supply the handheld IceMaster device, a carbon dioxide flask with feed pipe or tank and a high performance compressor are needed. The need for compressed air is small, at a rate of 0.75-8.00 m^3/min (depending on facility size). IceMaster can run at 4.5 bar, is almost maintenance-free, and is simple to use.

A countercurrent continuous washing apparatus for tar removal under ultrasonic irradiation has been developed by Kopparal et al. (2005). Tar was dissolved in dimethylformamide (DMF) and sand was soaked into the resulting tar solution to prepare samples of tar-contaminated sand. Tar contents in DMF were determined by a UV-spectrophotometer from absorbance at 336.5 nm. The removal rate of tar content from this tar-contaminated sand was measured in two different conditions, one under the condition of mechanical stirring and the other with ultrasonically induced agitation. The removal rate was described in terms of a first order reaction equation, which enables us to calculate the residue fraction in continuous washing at a steady state. Comparison of tar-removal with mechanical stirring and ultrasonically induced agitation has demonstrated that the ultrasound is more effective than the simple mechanical stirring.

Sheldon (2005) found a nontoxic, nonhazardous, environmentally safe composition provides an effective, fast-acting cleaning solution for removal of tar, oils, asphalt and other bituminous materials from industrial equipment surfaces. The composition is a mixture of a carrier monocyclic monoterpene and a nonionic surfactant such as an alkylphenol ethoxylate. The mixture is applied directly to surfaces to be cleaned, and rinsed with water in the absence of mechanical intervention.

Zaki and Troxler (2005) found that water-soluble solvent compositions removed petroleum residue from a substrate, including:

- from about 10 to about 60 percent by weight of an aromatic ester
- from about 30 to about 60 percent by weight of an aliphatic ester
- from 0 to about 15 percent by weight of a co-solvent
- from 0 to about 20 percent of one of a cyclic terpene and a terpenoid
- from 0 to about 1 percent by weight of an odor-masking agent
- from 0 to about 20 percent by weight of a nonionic surfactant.

The composition can further comprise water. The method for removing petroleum residue from a substrate can further comprise recycling the solvent by using a countercurrent separation column charged with compressed ammonia and/or carbon dioxide and a spinning band distillation column to separate the solvent from the petroleum residue.

5 Discussion of Literature and Experimental Protocol

From the review of the literature it appears that the best performing solvents all have an appreciable ability to dissolve asphalt and asphalt compounds. Both terpene-based compounds and vegetable oil esters appear to be especially favored due to their perceived environmental friendliness. The inclusion of surfactants appears to aid the process. This may explain the differences in effectiveness along with other compounding differences for the widely different cleaning efficacies of a number of apparently terpene based cleaners (Kulkarni et al. 2003). It appears that dioctylsulfosuccinate could be particularly useful (based on Phieffer et al. 2003).

The use of H_2O_2 (Lahib 2003) is intriguing, but the results were obtained on glass surfaces. Whether such an approach will work on metal surfaces remains to be studied.

The physical approach of cryogenic blasting may also be particularly useful as no chemicals are involved and such processes have a history of use within the DOD.

Only two of the above cited papers (Kulkarni et al. 2003; Brant and Canon 1996) are of direct relevance to adoption of an experimental protocol to evaluate solvent effectiveness for removal of asphalt. The protocol as discussed by Kulkarni et al. (2003) was also used in Zaki and Troxler (2005) and is summarized in the following section.

Protocol 1

Steps

1. Number each aluminum dish and determine its weight. The dishes used are FISHERBRANDTM Aluminum Weighing Dishes (Fisher Scientific, Pittsburgh, PA). The catalog number is 08-732 and the capacity of each dish is 42 mL.

2. Apply 1.5 g of emulsified asphalt (CRS-2) into the standard aluminum dish, ensuring that asphalt emulsion fully covers the bottom surface area of the dish.
3. Heat the aluminum dish, with asphalt emulsion, for 24 hours at the temperature of 140°F (60°C).
4. Remove the dish after 24 hours and cool it to room temperature. Determine the weight of the dish and calculate the weight of residual asphalt.
5. Apply 0.5 g of solvent into the dish by dropper. Make sure that the asphalt remains completely submerged in the solvent for 5 minutes.
6. Let the dish drain for 5 minutes by putting it upside down.
7. Rinse the dish thoroughly for 5 minutes under running water.
8. Heat the dish at 140° F (60° C) for 15 hours to remove the traces of water completely.
9. Weigh the dish to calculate asphalt removed.

Strengths and weakness

This protocol is clearly defined, easily carried out and allows quantitative comparisons of the different solvents. However, it suffers from the restriction of using a fixed substrate (aluminum). This raises the possibility that the results obtained with this test may not be applicable to other surfaces, especially to painted surfaces. Another drawback in this method is that it measures the relative effectiveness of the dissolution powers of the solvent alone. In normal practice, additional form of energy input may be present from activities such as wiping or spraying. Finally, a water rinsing step is also employed in this protocol. As explained in Zaki and Troxler (2005), this step simulates the practice among asphalt paving workers of applying a cleaning solvent to the truck beds followed by water rinsing to minimize residual solvent. Apparently, an excessive residual causes poor quality asphalt by leaching binders from the mix. This consideration may not be relevant for the present application of cleaning vehicles prior to rebuilding.

A second protocol, obtained from Sheldon (2005), is detailed in the following section.

Protocol 2

Preparation of test strips

The assay uses test strips of stainless steel with dimensions 1.5 in. x 2.0 in. x 1/32 in. Immersions in solvents were carried out by placing the strips in clamps and immersing two thirds of the total area of the strip. This provides a total uniform area of exposure of 2.0 sq in. (the 1/32-in. thickness of the strip was disregarded. The strips were desiccated and weighed with the clamp assembly, so that the strip itself would not be handled.

The asphalt used in these experiments was a standard commercially available material containing latex polymers called CRS28 manufactured by Patterson Oil Company, Sullivan, Mo. On procurement, each batch was cured by heating in a conventional laboratory oven for 7 days at 200 °F.

A bath of the cured latex polymer-containing SuperPave asphalt was heated to 175-180 °F. The strips were immersed in the molten asphalt to provide 2.0 sq in. of exposure. Exposure time was 2-3 seconds. The strips were cooled to room temperature and desiccated for 24 hours, and weighed. Each data point is the arithmetic average of 10 strips treated identically.

Assay

The strips were immersed in the test solvents so that the entire asphalt coated areas were exposed to the solvent. The strips were withdrawn from the solution after 60 seconds and drained for 2 minutes. They were again immersed for 60 seconds and withdrawn. The strips were allowed to dry at room temperature for 2 hours and desiccated overnight. Dissections were performed in an ordinary bell jar in the presence of a standard commercial desiccant. The test strips were then reweighed. The data expressed in percent by weight of removal was calculated by subtracting the weight of the treated strip from the weight of the untreated strip and dividing by the weight of the untreated strip.

Strengths and weakness

This too is a clearly defined protocol that allows replications, and quantitative evaluations. While the coating of the strips by immersion may lead to

variations in the individual weight, this can be minimized by simultaneous dip coating, temperature control, and simultaneous withdrawal. The effect of such variations can also be accounted for by normalizing the residual amount with respect to the initial coat weight. This protocol also follows a more rigorous and, in our opinion, a realistic aging of the asphalt contaminants that are likely to adhere to military vehicles. Finally, the protocol allows flexibility in the choice of coupons. One drawback in this method is that it measures the relative effectiveness of the dissolution powers of the solvent alone. In normal practice, additional form of energy input may be present from activities such as wiping, or spraying. While this protocol does not explicitly include a water rinsing step, reading of the reference clearly indicates that such a step is usually carried out.

6 Experimental Study

Based on the literature review of the protocols presented in the previous section, a modified protocol as described below was followed for this experimental study.

Preparation of Test Strips

The assay uses test strips of stainless steel with dimensions 4 in. x 6.0 in. x 1/50 in. Immersions in solvents were carried out by placing the strips in clamps and immersing two thirds of the total area of the strip. This provides a total uniform area of exposure of 12.0 sq in. (The 1/50-in. thickness of the strip was disregarded.) The strips were desiccated and weighed with the clamp assembly so that the strip itself would not be handled.

The asphalt used in these experiments was a standard commercially available material labeled CRS-2. The strips were dried in an oven for 24 hours at 60 °C. At the end of the drying period, the strips were cooled to room temperature and weighed. A thin edge from the bottom of the strip where lip formation was seen was removed manually.

Assay

The strips were immersed in the test solvents so that the entire asphalt coated areas were exposed to the solvent. The strips were withdrawn from the solution after 60 seconds and drained for 2 minutes. This was repeated two more times for a total of three solvent rinses. Following this the strips were washed in water. The strips were allowed to dry at room temperature for 2 hours and were desiccated overnight. The test strips were then reweighed. The data expressed in percent by weight of removal was calculated by subtracting the weight of the treated strip from the weight of the untreated strip and dividing by the weight of the untreated strip.

The removal of a thin edge and the addition of a solvent and water rinse eliminated the lip formation and residues.

Evaluation of solvents

Four solvents were chosen (Table 4): (1) Diesel, (2) Bioclean, (3) Bio T Max, and (4) Axarel 32. Diesel was a reference solvent. Bioclean, Bio T Max, and Axarel 32 were selected as test solvents. Axarel 32 represented a different class of solvents without terpenes that is rinsable with water, from which it separates quite easily so that it can be recycled. It can be applied by a number of methods including immersion, pressure washing, and operated in an ultrasonic bath.

A few other solvents including ethyl lactate, dibasic esters, and X-Force were tested with little success. An aqueous solution formulated with dioctylsulfosuccinate was also not effective.

Table 4. Cost and characteristics of solvents selected for testing.

Solvent	Composition*	Characteristics	Capacity**	Price ($/gallon)
Diesel	Hydrocarbons	—	>10 g asphalt/10 g solvent	$ 4.49
Bioclean	Orange terpene- 55-65% (w/w) Ethyl Lactate – 35-45% (w/w)	Physical State: Liquid Odor: Citrus Sp. Gravity: 0.90 g/cc VOC: 900 g/L Boiling point: 125 °C Flash Point: 45 °C Canadian WHMIS:D2B (toxic), B3(combustible)	>10 g asphalt/10 g solvent	$44.75
Bio T Max	D-Limonene	Physical State: Liquid Odor: Citrus Sp. Gravity: 0.863 g/cc VOC: 780 g/L Boiling point: 167 °C Flash Point: 54.4 °C Canadian WHMIS: no data	>10 g asphalt/10 g solvent	$25.65
Axarel 32	Aliphatic Hydrocarbons- 70-90% (w/w) Diisobutyl dibasic acid esters- 15-20% (w/w) Alkyloxy polyethylene oxyethanol- 4.5-9.5% (w/w)	Physical State: Liquid Odor: hydrocarbon Sp. Gravity: 0.85 g/cc VOC: n/a Boiling point: 221-295 °C Flash Point: 96 °C Canadian WHMIS: Not a controlled product	>10 g asphalt/10 g solvent	$44.92

* As provided in MSDS; may include other constituents

** Determined by dissolving asphalt in solvent

Data analysis and interpretation

Table 5 lists the raw data for the four solvents tested. Note that the residual amounts of asphalt for both diesel and Bioclean were much improved compared to the trial results. This is attributable to the elimination of the lip formation observed previously.

Table 5. Raw data for the three solvents evaluated.

Solvent	Diesel	Bioclean	Diesel	BioTMax	Diesel	Axarel 32
	98.74	97.37	97.9	98.23	95.79	94.09
	98.44	99.64	97.57	97.33	94.09	94.48
	98.01	99.72	97.65	98.14		96.60
	98.16	99.58	96.52	97.89		95.53
	98.84	99.18	98.39	98.3		93.97
		99.55	97.54	97.33		97.27
Average %deviation	98.44	99.17	97.60	97.87	94.94	96.65
Std. Dev	0.36	0.91	0.61	0.44	1.20	1.36

An Analysis of Variance (ANOVA) analysis (Table 6) reveals a significant difference between Bioclean and Diesel at the 0.05 level, but not between Diesel and BioTMax. The results between Diesel and Axarel 32 were not subject to statistical analysis as the diesel samples were few. Appendix C includes photographs of the coupons.

Table 6. ANOVA analysis of test results (single factor summary)

Groups	Count	Sum	Average	Variance		
Diesel	5	492.191	98.4382	0.129035		
Bioclean	6	595.0416	99.17359	0.8191		
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.474919	1	1.474919	2.878427	0.124006	5.117357
Within Groups	4.611639	9	0.512404			
Total	*6.086558*	*10*				
Diesel	6	585.57	97.595	0.37747		
BioTMax	6	587.22	97.87	0.1942		
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.226875	1	0.226875	0.793727	0.393906	4.964591
Within Groups	2.85835	10	0.285835			
Total	*3.085225*	*11*				

7 Conclusions and Recommendation

This study revealed that at least two broad categories of solvent blends (terpene based solvents/esters, and blends of aliphatic hydrocarbons and esters assisted by surfactants) can remove asphalt from metal. Of the solvents tested, Axarel 32, appears to combine both functionality and desirable environmental characteristics. However, the feasibility of using these solvents for routine large scale cleaning will have to be demonstrated in the overall framework of economics, environment, and health.

It is recommended that follow-on studies be conducted within a constraining set of environmental and health criteria and price. Given such constraints, it should be possible to formulate a custom solvent system and cleaning protocol within the constraints.

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Appendix A: Additional Information on Reviewed Tar Removing Solvent Systems

No.	Company	Solvent	*BP	*VP mmHg	*VOC g/L	*FP	Major Chemicals	Performance	Cost	Residuals/ Byproducts	Waste Disposal	toxic
1	Beaver Research 3700 W. Kilgore Rd. Portage, Michigan 49002 Toll Free: 800.544.0133 Phone: 269.382.0133 Fax: 269.382.0214 sales@beaverresearch.com	57 A	360-410°F	30 @ Room Temp.		145°F *TCC Tester	Diethanolamine (D-60) Solvent Naphtha Medium Aliphatic	Rinses freely & completely		CO & CO2	Incinerate according to fed, state, local regs.	No toxic chemicals according to reporting requirements Section 313 40 CFR Part 372
2	Biochem systems BioChem Systems 3511 N. Ohio Wichita, KS 67219 TEL: (316) 838-4739 - - (800) 777-7870 FAX: (316) 681-2168 http://www.biochemsys.com/	Bio T Max	334°F	<2	780	130°F *PMCC Tester	D-limonene	Wipe clean or rinse with water Can be diluted Hand wipe Ultrasonic tank Dip tank Conveyorized spray system Pressure sprayers	$25.65/g	CO	Biodegradable	Non-toxic No chlorinated solvents & petroleum distillates.
3	BioSystems, Inc. P.O. 464 Fort Collins, CO 80522-0464 (800) 224-4605 info@biosystemsinc.com	BioPro	347°F	2		>122°F CC Tester	D-limonene nonionic surfacant	Insoluble in water			100% biodegradable	Non-toxic No aerosol No CFCs
4	Chemco Industries 5731 Manchester Ave. St. Louis, MO, 63110 1-800-854-4236 Fax: 314-647-1850 info@ChemcoCorp.com	Tarva Sol	349°F	25 1.4	N/A	125°F *TCC Tester	D-lemmonine	Spray on, wipe off, can be diluted with H2O	5g PA $21.60 g	CO & CO2	Biodegradable	
5	Cleanline Products, Inc. PO Box 625 Canton TX 75103 1-888-536-5185 Fax: 903-567-4600 info@cleanlineproducts.com Coastwide Labs www.coastwidelabs.com 1-800-775-3289	Citrus Blast	<300°F 212°F	as water NA		128°F *COC Tester <160°F *COC Tester	Isoparaffins Nonionic surfactant Beta-Pinene Citrus Distillate	Dissolves no scrubbing wipe away suspended particles	32oz 128 oz 55g drums 12-1qt case 4-1g case 55g drum	From Combustion: smoke, CO2 , unknown organic compounds.	Biodegradable organics. Biodegradable No phosphates or petroleum products	Non toxic as far as known to Coastwide
6	Coastwide Labs www.coastwidelabs.com 1-800-775-3289	Orange Water-less	212°F	NA		<160°F *COC Tester	Nonionic surfactant Beta-Pinene Citrus Distillate	Dissolves no scrubbing wipe away suspended particles	12-1qt case 4-1g case 55g drum		Biodegradable No phosphates or petroleum products	Non toxic as far as known to Coastwide

No.	Company	Solvent	*BP	*VP mmHg	*VOC g/L	*FP	Major Chemicals	Performance	Cost	Residuals/ Byproducts	Waste Disposal	toxic
7	Cogent Environmental Solutions 13 Adrian Ave., Mans field, Ontario Canada L0N 1M0 Tel: (705)-434-4489 Fax: (705)-434-9675 cogentenvironmen-tal@ecogent.ca	ECO-gent	N/A			none	2-Hydroxypropanoic acid Alkyl polyglycoside Glucopyranose, oligomeric, decyl octyl glycosides	Apply undiluted, allow to penetrate, agitate with cloth or sponge rinse.	1g 5g 55g	May include & not limited to oxides of carbon.	Review fed, state, local regs before disposal.	No pesticides or preservatives
8	Delco Cleaning Systems of Fort Worth 2513 Warfield Street, Fort Worth, Texas 76106-7554 Phone: 800-433-2113 817-625-4213 Fax: 817-625-2059 mailto:delco@dcs1.com http://www.dcs1.com/	R-109 Delco Red Truck Wash Powder		Spec. Grav. 7.84lb/ g.			Sodium Metasilicate, Penta Glycol Ether EB	Cold pressure washers, hot high pressure washers and steam cleaners	50lb $141 100lb $260 500lb $1,170 1000lb $1,600 Mix 0.5lb/g		See local authorities for restrictions on disposal for chemical waste	
9	EaCo Chem. Inc. 765 Commerce Avenue New Castle, PA 16101 1-800-313-8505 Fax: (724) 656-0757 info@eacochem.com	C-Tar Melt	N/A	VP N/A Spec. Grav. 0.85		>125°F (TCC)	Petroleum Hydrocarbon Ethylene glycol n-butyl ether	Can remove many materials in 15 mins. Heavy layers over night soak. Pressure washer rinsing with at least 1500 psi for best results.	EC 016-55g $1,005.00 EC 016-5g $106.90	Hazardous decomposition not known	Biodegradable Prevent material from entering sewers, storm drains, waterways	Non hazardous liquid
10	EcoLink – Corporate Headquarters 2177-A Flintstone Drive Tucker, GA 30084 800-886-8240 info@ecolink.com	Electron 296	349°F	0.3 @ 68°F	810	147°F *TCC Tester	Citrus terpene Severely Hydro-treated Light Distillates	Fully evaporative, leaves no residue	55g $1,181.72 5g can $101.04	May form CO and CO2	Not Haz. Waste prod. Dispose according to regs.	Non hazardous EPA & OSHA definitions.
11	Inland Technology, Inc. 401 East 27th St. Tacoma, WA 98421 800-552-3100 inland@inlandtech.com	Teksol EP	310°F	(mmHg /70°F): <10 mmHg	% by volume 100	112°F PMCC	Hydrotreated heavy naphtha/C10-C11 paraffinic hydrocarbons D-Limonene	Insoluble in water	5 g $232.84	Haz Decomp Products: Oxides of carbon and Hydrocarbons	Contact Fed State or local Environmental regulatory agencies	
12	Kleen All Plus (800) 537-9545 info@kleenallplus.com	#141 Vehicle Wash	212°F	N/A			Dipropylene Glycol Methyl Ether Anhydrous Sodium Hydroxide		55 g drum $399 plus freight. Mili-tary $325 1 drum	No byproducts	Review fed, state, local regs before disposal	

No.	Company	Solvent	*BP	*VP mmHg	*VOC g/L	*FP	Major Chemicals	Performance	Cost	Residuals/ Byproducts	Waste Disposal	toxic
13	Momar 1830 Ellsworth Industrial Dr. Atlanta, GA 30318 404-355-4580	Agri-Sol	300-320°F	1.6	non-volatile	250°F	Methyl Ester Soybean oil	Dissolves asphalt/tar on contact. Spray 1 gal on 100sq ft without diluting. Allow to soak for 3-5 minutes to penetrate & dissolve. Hose	55 g drum $33.75/g 35 g drum $34.05/g 20 g drum $34.40/g 5 g metal pail $35.50/g 4/1 g case $37.40/g	CO, CO_2	Biodegradable, biobased emulsifiable	No chlorinated solvents HAPs or CFCs
14	Momar 1830 Ellsworth Industrial Dr. Atlanta, GA 30318 404-355-4580	Vega-Sol	340-372°F	not estab-lished	low % volatile by vol. >40	>145°F	Ethyl lactate Methyl Ester Soybean oil	down using water under pressure. For stubborn areas scrub with a brush or scouring pad to rinse.	55 g drum $50.85/g 35 g drum $51.15/g 20 g drum $51.50/g 5 g metal pail $52.60/g 4/1 g case $54.50/g		Biodegradable, biobased emulsifiable	No chlorinated solvents HAPs, CFCs ODCs
15	Ostrem Chemical Co. 2310-80 Ave Edmonton AB T6P 1N2 (780) 440-191	T-300 Tar Remover	320°F	N/A		114.8°F *TCC Tester	Petroleum Distillates Ethylene Glycol Monobutyl-Ether	Apply full strength with pressure sprayer or brush. Allow 5 mins contact time, rinse with steam or hot water.	205L drum $1,167.70 (Canadian) 20L Pail $139.83 (Canadian)	Haz. Combustion products: fumes, smoke, CO & sulfur oxides in case of incomplete combustion.	Treat as petroleum solvent. Dispose according to local regs.	
16	Petroferm, Inc. 2416 Lynndale Road Fernandina Beach, FL 32034 904-261-8286 FAX: 904-261-6994	Axarel 32	430-563°F	<0.1 68°F		205°F *PMCC Tester	Mixed aliphatic hydro-carbons Diisobutyl dibasic acid ester mixture diisobutyl glutarate diisobutyl adipate diisobutyl succinate Alkyloxy polyethylene oxyethanol		$44.92/g		Waste treat or incinerate used material in compliance with all applicable government regulations.	Diisobutyl dibasic acid esters
17	Schaeffer Manufacturing Co. Eau Galle, Wisconsin 715-283-4031 4molyoil@wwt.net	#739 Citrol II		PSIG @ 70°F: Max 50			Monocyclic terpene	Spray on or apply by brush. For best results let set for 5 min Rinse with H20	55g drum $1,437.15 12 can/case $89.86	CO2	Biodegradable Citrol II waste treatable by standard POWTPs. Not considered a primary pollutant.	All natural, organic citrus based solvents

No.	Company	Solvent	*BP	*VP mmHg	*VOC g/L	*FP	Major Chemicals	Performance	Cost	Residuals/ Byproducts	Waste Disposal	toxic
18	Selden Research Ltd Staden Business Park Staden Lane, Buxton Derbyshire, SK17 9RZ Tel : 01298 26226 sales@selden.co.uk	Tar N Glue				116°F	1,2,4-Trimethylbenzene Alcohol Ethoxylate Solvent, Light aromatic Naptha (Petroleum) Xylene-ortho	Apply soft cloth & rub until residue removed. Wipe all areas with wet sponge.			Dispose waste & residues in accordance with local authority requirements.	Vapor can be hazardous if inhaled.
19	Sentinel Products, Inc. 51 NE 77th Ave Minneapolis, MN 55432 800-373-0633 Fax 763-571-1819	Sentinel 700	370-518°F	Negligi-ble		146°F	Refined petroleum solvents Ethylene Glycol Monobutyl Ether	Apply surface Agitate or soak for 4-8 mins. Rinse with H2O under pressure		Thermal decomposition in presence of air may yield CO and/or CO2.		All natural, no hazardous chlorinated or flammable solvents. Non caustic & non corrosive.
20	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYSolv	420°F	<1	<50g/L		Mixed Fatty & Methyl Esters: Linoleic Oleic Palmitic Linolenic Stearic Palmitoleic Erui		32oz spray $10.72		Biodegradable	Non toxic
21	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYSolv II	420°F	0	<50g/L		Mixed Fatty Acid Methyl Esters		32oz spray $12.80	Thermal decomposition CO & CO2 from burning.	Biodegradable	Non toxic
22	SOYsolve 6154 N CR 33 OH 44883 800-231-4274 Fax: 419-992-4595 sales@soysolv.com	SOYSolv II Plus	292°F	0.9 @ 68°F			Ethyl Lactate Methyl Soyate			Decomposes to H2O & CO2 completely combusted.	Biodegradable	Non toxic
23	Sspenviro Safety Short Production Environmental Division 950 Gemini, Suite 1 Houston TX 77058 1-800-458-2236 Fax 281-956-1000	GoldSolv	>200°F	<5@ 70°F	0	212°F	Organic ingredients	Apply with sprayers, brushes, rollers. Rinse with H2O	Case (6-1g jugs) $125.00 5g pail $102.50 30g drum $573.95 55 g drum $997.50	No decomposition products	Biodegradable	

No.	Company	Solvent	*BP	*VP mmHg	*VOC g/L	*FP	Major Chemicals	Performance	Cost	Residuals/ Byproducts	Waste Disposal	toxic
24	United Labs Canadian Headquarters United Laboratories of Canada 214 Dolomite Drive Toronto, ON M3J 2N2 (800) 323-2594 sales@unitedlabsinc.ca	United 399	347°F	~1.0 @ 77 F	7lbs/ gal	115-125°F *TCC Tester	d-1,8(9)-p-menthadiene	Don't allow to dry on surface. Hose off with water.	Liquid 5L Liquid 20L Liquid 200L	When ignited produces CO and CO2.	Accumulate run-off into oil/water separator.	No petroleum distillates, acids, or caustics
25	Walter Surface Technol. J. Walter Inc. 810 Day Hill Road Windsor, CT 06095 (800) 522-0321 Fax: (860) 560-7300	Bio Clean	257°F		900g/L	113 F	Orange terpenes Ethyl Lactate		$44.75/g	Carbon oxides	Dispose according to local, state, Fed. Regs.	
26	Walter Surface Technol. J. Walter Inc. 810 Day Hill Road Windsor, CT 06095 (800) 522-0321 Fax: (860) 560-7300	X-Force (L-74E)	>500°F			266 F			Bottle 5L $67.91	CO	Biodegradable	Non-hazardous Non-toxic

* BP = Boiling Point
* VP = Vapor Pressure
* VOC = Volatile Organic Compound
* FP = Flash Point
* TCC = Tag (Tagliabue) Closed Cup Tester
* PMCC = Pensky-Martens Closed Cup Tester
* COC = Cleveland Open Cup Tester

Appendix B: Material Safety Data Sheets

No.	Product	Manufacturer
1	57A Degreaser	Beaver Research Company
2	Bio T Max	BioChem Systems
3	BioPro	BioSystems, Inc.
4	Tarva-Sol Chem 243	Chemco Industries
5	Citrus Blast	CleanLine Products
6	Orange Waterless	Coastwide Laboratories
7	EcoGent Universal Cleaner	Cogent Environmental Solutions
8	R-109 Delco Red	Delco Cleaning Systems
9	C-Tar Melt	EaCoCHEM
10	Electron 296	Ecolink
11	Teksol EP	Inland Technology
12	#141 Vehicle Wash	Kleen all Plus
13	Agri-Sol	Momar
14	Vega-Sol	Momar
15	T-300 Tar Remover	Ostrem Chemical Company
16	Axarel 32	Petroferm
17	#739 Citrol II	Schaeffer Mfg. Company
18	Tar N Glue	Selden Research Limited
19	Sentinel 700	Sentinel
20	SOYSolv	SOYsolv
21	SOYSolvII	SOYsolv
22	SOYSolvII Plus	SOYsolv
23	GoldSolv	SSpenviro
24	United 399	United Labs
25	Bio Clean	Walter
26	X-Force (L-74E)	Walter

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements

U.S. Department of Labor
Occupation Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY
57 A DEGREASER (210110)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

D.O.T. Hazard Class: Combustible liquid (regulated in bulk only)

Manufacturer's Name		Emergency Telephone Number
Beaver Research Company		1-800-255-3924 (Chem-Tel)
Address (Number, Street, City, State, and ZIP Code)		Telephone Number For Information
3700 E. Kilgore Road, Portage, MI 49002		1-800-544-0133
NFPA 4=Extreme, 3= Serious, 2=Moderate, 1=Slight, 0=Insign. Toxicity-0 Fire-1 Reactivity-2 Special-0	HMIS Ratings: 4=Extreme, 3=Serious 2=Moderate, 1=Slight, 0=Minimal Health-1 Flammability-2 Reactivity-0	Date Prepared 12/23/99 Signature of Preparer (optional)

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	CAS No.	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Diethanolamine	111-42-2	N/A	0.46ppm (skin)	NIOSH REL= 3ppm TWA	
(D-60) Solvent Naphtha, Medium Aliphatic	64742-88-7	N/A	N/A	manufacturer recommends 200ppm total hydrocarbon as occupational exposure limit	

This product does not contain any toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR Part 372.

Section III - Physical/Chemical Characteristics

Boiling Point	360°-410°F	Specific Gravity (H2O = 1)	0.79
Vapor Pressure (mm Hg)	30 @ R.T.	% Volatile by Volume	94.5
Vapor Density (AIR = 1)	5.0	Evaporation Rate (Butyl Acetate = 1)	<1

Solubility in Water
Negligible

Appearance and Odor
Dark liquid, mild hydrocarbon odor.

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
145°F (TCC)	Volume % in Air	0.9	7.0

Extinguishing Media
CO_2, dry chemical, alcohol foam, water mist (fog).

Special Fire Fighting Procedures
Use SCBA, wear protective equipment.

Unusual Fire and Explosion Hazards
None

Section V - Reactivity Data

Stability	Unstable		Conditions to Avoid	Heat, sparks, open flame.
	Stable	X		

Incompatibility (Materials to Avoid)
Strong oxidizers

Hazardous Decomposition or Byproducts
CO and CO_2

Hazardous Polymerization	May Occur		Conditions to Avoid	None
	Will Not Occur	X		

57 A Degreaser - Page 2 **12/23/99**

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
	Yes	Yes	Yes

Health Hazards (Acute and Chronic)

Dizziness, nausea, headaches, vomiting, dryness of the skin, irritation to the eyes and skin.

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
N/A	N/A	N/A	N/A

Signs and Symptoms of Exposure

See Health Hazards above.

Medical Conditions Generally Aggravated by Exposure

N/A

Emergency and First Aid Procedure

Do not induce vomiting, move to fresh air, resusitate if necessary, wash thoroughly, flush eyes for 15 minutes.

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled

Contain spill; provide adequate ventilation; keep people away; extinguish all ignition sources; keep material out of public waters; use dry absorbent on small spills.

Waste Disposal Method

Incinerate according to all federal, state, and local regulations.

Precautions to be Taken in Handling and Storage

Store in dry, cool area; keep containers closed; use adequate ventilation; wash thoroughly after handling; use protective clothing; no ignition sources present.

Other Precautions

Can ignite when ignition source is present.

Section VIII - Control Measures

Respiratory Protection (Specify Type)

NIOSH approved organic vapor cartridge.

Ventilation				
	Local Exhaust	preferred	Special	N/A
	Mechanical(General)	acceptable	Other	N/A

Protective Gloves	Eye Protection
Rubber or neoprene	Safety glasses or goggles

Other Protective Clothing or Equipment

Rubber apron and boots; eye bath, safety shower.

Work/Hygienic Practices

N/A

BioChem SYSTEMS

MATERIAL SAFETY DATA SHEET

Product: **BIO T MAX**
Date: May 1, 1995
Revision Date: April 2, 2007

SECTION I. MATERIAL IDENTIFICATION

Trade/Material Name: Bio T Max

Manufacturer: BioChem Systems, Inc.
3511 N. Ohio
Wichita, KS 67219

Phone: 800-777-7870 (Business)
800-633-8253 (Emergency)
Cage Number: 0XYG0

SECTION II. INGREDIENTS AND HAZARDS

Ingredient Name:	Exposure Limits:	CAS #
D-limonene	N/D	5989-27-5

All components that comprise Bio T Max are registered on the TSCA inventory.

SECTION III. PHYSICAL DATA

Appearance & Odor:	Clear yellow liquid; citrus odor.
Boiling Point:	334°F
Evaporation Rate (H_20 = 1):	<1
Vapor Pressure:	<2 mm Hg (Primary Constituent)
Specific Gravity (H_20 = 1):	0.863 @ 25°C
Melting Point:	Liquid @ 25°C
Vapor Density (air = 1):	>1
pH (10% in water):	7.5-8.5
Solubility in Water:	Dispersible
VOC Content (g/l):	780

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point (method):	130°F (PMCC)
Limits:	LEL %: N/D UEL %: N/D
Extinguishing Media:	Dry chemical, carbon dioxide or halon.
Unusual Fire or Explosion Hazards:	Guard against spontaneous combustion of improperly discarded oily rags.
Special Fire Fighting Procedures:	Use self-contained breathing apparatus. Do not use water.

SECTION V. REACTIVITY DATA

Chemical Stability:	Hazardous polymerization will not occur.
Chemical Incompatibilities:	Avoid contact with strong oxidizing agents.
Conditions To Avoid:	Avoid use of any ignition sources near spill.
Hazardous Decomposition Products:	Carbon monoxide.

SECTION VI. HEALTH HAZARD INFORMATION

Carcinogenicity: This product is not considered a carcinogen.

Medical conditions which may be aggravated by contact: Predisposition to allergic contact dermatitis.

Primary entry route(s): Inhalation, skin contact, eye contact, ingestion.

SECTION VI. HEALTH HAZARD INFORMATION (cont.)

Signs and symptoms of overexposure:

Eye Contact: Causes irritation

Skin Contact: Causes irritation

Inhalation: Prolonged inhalation of aerosol/vapor may result in drowsiness, headache and uncoordination if used extensively in absence of general ventilation.

First Aid:

Eye Contact: Flush eyes with copious amounts of water; see physician.

Skin Contact: Wash skin with mild soap and water.

Inhalation: Move victim to fresh air.

Ingestion: Do not induce vomiting. Rinse mouth with water then drink one glass of water. Contact physician immediately. Never give anything by mouth if victim is unconscious, is rapidly losing consciousness, or is convulsing.

SECTION VII. SPILL, LEAK AND DISPOSAL PROCEDURES

Spill/Leak Procedures: Avoid use of any ignition source near spill. Contain product with inert material or absorbent medium such as activated carbon or kitty litter.

Waste Management/Disposal: Hazardous substances cleaned with this product may be considered hazardous waste. Unused portions of this product must be disposed of as ignitable waste. Dispose of hazardous waste in accordance with all local, state and federal regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Personal Protective Equipment:

Eye Protection: Goggles

Gloves: Impermeable gloves (Nitrile)

Respirator: Not required in presence of good general ventilation. If conditions warrant, use NIOSH approved respirator.

Other: Avoid wearing clothes saturated with cleaner.

Workplace Considerations:

Ventilation: General mechanical ventilation.

Safety Stations: Emergency eye wash and shower stations.

SECTION IX. SPECIAL PRECAUTIONS

Special Handling/Storage: Store in original container in well-ventilated areas at temperatures below 140°F. Store in closed containers away from heat or sources of ignition and oxidizing materials. Protect against physical damage to containers.

Other Precautions: Avoid contact with skin, eyes and mucous membranes.

Hazard Class: UN 2319 (Flammable Liquid when shipped by air, internationally, or in bulk quantities. **Combustible Liquid and unregulated by DOT when shipped domestically by land in non-bulk quantities**.)

CAS Number: Proprietary Blend **R.C.R.A. Hazard Class:** Ignitable

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

HMIS*
HEALTH 1 REACTIVITY 0
FLAMMABILITY 2 PERSONAL PROTECTION **None**

IDENTITY (As Used on Label and List)
BIO PRO

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

SECTION I

Manufacturer's Name
BioSystems, Inc.

Emergency Telephone Number
(800)424-9300 Chemtrec

Address (Number, Street, City, State, and ZIP Code)
P.O. Box 464

Telephone Number for Information
(970) 224-4605

Ft. Collins, CO 80522-0464

Date Prepared
07/01/05

Signature of Preparer (optional)

SECTION II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	%(optional)
d-Limonene				
nonionic surfactant				

SECTION III - Physical/Chemical Characteristics

Boiling Point
175.5-176.5C

Specific Gravity (H20 = 1)
0.85

Vapor Pressure (mm Hg.)
2

Melting Point
N/A

Vapor Density (AIR = 1)
4.7

Evaporation Rate
(Butyl Acetate = 1)
Less than 1

Solubility in Water
No

Appearance and Odor
Orange color with characteristic citrus odor

SECTION IV - Fire and Explosion Hazard Data

Flash Point (Method Used)
(Closed Cup) >122 F

Extinguishing Media
Dry Chemical, CO2, Foam

Special Fire Fighting Procedures
Water may be used to cool closed containers of product exposed to heat.

Unusual Fire and Explosion Hazards
Avoid heat, sparks and open flames. Explosive vapor-air mixtures may be formed at elevated temperatures. Closed containers present possible pressure build up and explosion due to heat exposure.

Bio Pro - P.2

SECTION V - Reactivity Data

Stability		Conditions to Avoid
	Unstable	**Excessive heat**
	Stable **X**	

Incompatibility (Materials to Avoid)
Strong oxidizing agents, mineral acids, and acidic clays.

Hazardous Decomposition or Byproducts
None

Hazardous Polymerization		Conditions to Avoid
	May Occur	**None**
	Will not Occur **X**	

SECTION VI - Health Hazard Data

Route(s) of Exposure:
Absorption of d-Limonene can occure following oral, skin, eye or inhalation exposure.

Health Hazards (Acute and Chronic)
Acute health hazards are primarily irritation of exposed areas. Nausea and vomiting may follow ingestion of large amounts.

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
	No	**No**	**No**

Signs and Symptoms of Exposure
Ingestion of large amounts may produce nausea, vomiting and diarrhea. Prolonged inhalation may produce respiratory tract irritation, nausea, and dizziness. Excessive skin exposure may produce minor irritation.

Medical Conditions
Generally Aggravated by Exposure **N.F.**

Emergency and First Aid Procedures **Remove from contaminated area using appropriate respiratory protection. Upon eye contact, flush with water. Upon skin contact, wash exposed area with soap and water.**

SECTION VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled
Collect and place in a suitable container. Prevent from reaching waterways. Sorbents may be used. Keep away from ignition sources.

Waste Disposal Method
To be performed in compliance with all regulations. Do-not landfill. Incineration preferred.

Precautions to be Taken in Handling and Storing
Store in properly labeled, tightly closed containers in cool, dry well-ventilated areas. Avoid skin and eye contact and prolonged inhalation exposure. Do not ingest.

Other Precautions
Remove and clean contaminated clothing and footware before reuse.

SECTION VIII - Control Measures

Respiratory Protection (Specify Type)
Use type approved for organic vapors by NIOSH for exposure to vapors

Ventilation	Local Exhaust	Special
	Provide closed systems and local exhaust to control vapors	**None**
	Mechanical (General) **General room dilution acceptable**	Other **None**

Protective Gloves	Eye Protection
Butyl Rubber or PVA	**Chemical goggles**

Other Protective Clothing or Equipment
Pumps and/or electrical ventilating fans should have explosion proof motors.

Work/Hygienic Practices
Normal

MATERIAL SAFETY DATA SHEET

CHEMCO INDUSTRIES, INC.
5731 Manchester Ave., St. Louis, MO 63110

DATE OF ISSUE: January, 05, 2006

GENERAL INFORMATION # : 314-647-1888
EMERGENCY TELEPHONE # : (800) 854-4236

I-PRODUCT IDENTIFICATION

TARVA SOL

PRODUCT CODE: #243
CHEMICAL FORMULATION: CITRUS BASED POWERFUL TAR & ASPHALT REMOVER
NFPA HAZARD IDENTIFICATION SYSTEM: **HEALTH:**2 **FLAMMABILITY:** 3 **REACTIVITY:** 0
HAZARD RATING: 4- Extreme; 3 - High; 2 - Moderate; 1 - Slight; 0 - Insignificant

II - HAZARDOUS INGREDIENTS

Hazardous Components (Specific Chemical Identity; Common Name (s))	CAS #	OSHA PEL	ACGIHTLV	Other Limits Recommended	% optional
SUBSTANCE					
D-LEMMONINE	5989-27-5	N/E	N/E		

Key: **PEL:** Permissible Exposure Limit **TLV:** Threshold Limit Value **C:** Ceiling Level **STEL:** Short Term Exposure Limit
N/A: Not Applicable **N/D:** Not Determined **N/E:** Not Established **Y:** Yes **N:** No
302: CERCLA List of Hazardous Substances and Reportable Quantities (40 CFR 302.4).
355: SARA TITLE III/ List of Extremely Hazardous Substances for Emergency Planning and Notification (40 CFR 355).
372: SARA TITLE III/ List of Toxic Chemicals subject to Release Reporting (Community Right to Know) (40 CFR 372).

III - PHYSICAL DATA

BOILING POINT (C/F): 349°F
MELTING POINT: N/A
VAPOR PRESSURE (mm Hg.)25 1.4
SPECIFIC GRAVITY (WATER = 1): 0.84
VAPOR DENSITY (AIR = 1): 0.012
VOC CONTENT (% by weight): N/A
SOLUBILITY IN WATER: EMULSIFIABLE
EVAPORATION RATE (Water = 1): 1
pH:
APPEARANCE AND ODOR: LIGHT AMBER BROWN WITH AN ORANGE FRAGRANCE

IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (F/(C): 125°F TCC
(TEST METHOD):
FLAMMABLE LIMITS: N/A **UPPER:** 6.0% **LOWER:** 0.7%
EXTINGUISHING MEDIA: DRY POWDER, FOAM

SPECIAL FIRE FIGHTING PROCEDURES: AVOID EXPOSURE TO FUMES OR VAPORS. WEAR SELF-CONTAINED POSITIVE PRESSURIZED BREATHING APPARATUS MSHA/NIOSH APPROVED OR EQUIVALENT.

UNUSUAL FIRE AND EXPLOSION HAZARD: KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME. USE SPRAY TO COOL ADJACENT FIRE EXPOSED CONTAINERS. COMBUSTIBLE.

V - REACTIVITY DATA

STABILITY: STABLE
INCOMPATIBILITY: CATIONICS (SEE ABOVE)
CONDITIONS TO AVOID: STRONG OXIDIZING AGENTS , SPARKS & FLAMES
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: CARBON DIOXIDE AND CARBON MONOXIDE
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: N/A

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: TARVA SOL **PRODUCT CODE: #243**

VI - HEALTH AND HAZARD DATA

ROUTES OF ENTRY: INHALATION? YES **SKIN?** NO DERMAL LD 50 5g/Kg **INGESTION?** ORAL ld50 (Rats) 5g/Kg
CARCINOGENICITY: **NTP?** N/E **IARC MONOGRAPHS?** N/E **OSHA REGULATED?** YES

EFFECTS OF OVEREXPOSURE

IF IN EYES: MAY CAUSE IRRITATION
IF ON SKIN: MAY CAUSE IRRITATION TO OPEN CUTS & SORES
IF SWALLOWED:

IF INHALED:

EMERGENCY AND FIRST AID PROCEDURES

IF IN EYES: FLUSH WITH FLOWING WATER FOR 15 MINUTES & SEE PHYSICIAN

IF ON SKIN: FLUSH WITH FLOWING WATER FOR 15 MINUTES. SEE A PHYSICIAN IF IRRITATION PERSISTS

IF SWALLOWED: GIVE MILK OR WATER TO DILUTE MATERIAL & DO NOT INDUCE VOMITING. SEE PHYSICIAN NEVER GIVE ANYTHING BY MOUTH TO ANY UNCONSCIOUS PERSON.

IF INHALED: REMOVE TO AREA OF FRESH AIR.

VII - SPILL AND LEAK PROTECTION

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: SQUEEGEE UP, MOP UP AND FLUSH TO SEWER WITH WATER.

WASTE DISPOSAL METHOD: DISPOSE OF IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE & LOCAL REGULATIONS

VIII - SPECIAL PROTECTION INFORMATION

VENTILATION: **Local Exhaust:** PREFERRED **Mechanical:** ACCEPTABLE AT POINT OF VAPOR RELEASE
Special: N/A **Other:** AVOID BREATHING OF VAPORS

RESPIRATORY PROTECTION: NONE REQUIRED WITH ADEQUATE VENTILATION.

PROTECTIVE GLOVES: IMPERVIOUS RUBBER, SOLVENT RESISTANT
EYE PROTECTION: CHEMICAL GOGGLES OR FACE SHIELD
OTHER PROTECTIVE EQUIPMENT: EYEWASH FACILITIES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: STORE AWAY FROM HEAT OR OPEN FLAME. KEEP CONTAINER CLOSED WHEN NOT IN USE. DO NOT CONTAMINATE WATER, FOOD OR FEED.

OTHER PRECAUTIONS: KEEP OUT OF REACH OF CHILDREN. DO NOT GET IN EYES, ON SKIN OR CLOTHING

WORK/HYGIENIC PRACTICES : PRACTICE GOOD PERSONAL HYGIENE. WASH AFTER HANDLING

REVISION DATE: January 05, 2005 Prepared By: DATE OF ISSUE: January 05, 2005

MATERIAL SAFETY DATA SHEET

SECTION ONE – GENERAL INFORMATION

Date: 05/06

Primary Trade Name:
Citrus Blast

GENERIC DESCRIPTION:
Grease Tar and Adhesive Remover

MANUFACTURER'S NAME AND ADDRESS:
Cleanline Products, Inc.
2021 Reserve Drive
Canton, TX 75103

EMERGENCY TELEPHONE NUMBER: 888/536-5185

SECTION TWO – HAZARDOUS INGREDIENTS/HEALTH HAZARD DATA

This product has not been tested as a whole for health effects on animals or humans. Hazardous ingredients as defined in 29 CFR 1910.1200 if any are not present at regulated levels.

Ingredients:	CAS#	OSHA/PEL	ACGIH/TLV
Isoparaffins	68551-19-9	400 ppm	400ppm

SECTION THREE – PHYSICAL DATA

BOILING POINT (P): over 300 F **pH: Neutral**
VAPOR PRESSURE (mm/Hg): Same as water **SPECIFIC GRAVITY (WATER=1) 1**
VAPOR DENSITY (AIR=1) N/D
SOLUBILITY IN WATER: Miscible **EVAPORATION RATE(ETHYL ETHER=1) <1**
APPEARANCE AND ODOR: Clear to yellow liquid with citral odor. Natural ingredient content may cause color to vary.

SECTION FOUR – FIRE & EXPLOSION HAZARD DATA

FLASHPOINT (METHOD):	AUTOIGNITION TEMPERATURE:	LEL:	UEL:
128 F (COC)	N/D	1.1% XOL	3.4% COL

EXTINGUISHING MEDIA"
Dry chemical, foam or CO2. **Do not use water**

SPECIAL FIRE FIGHTING PROCEDURES: Remove unignited material from area of fire. Cool closed containers with water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: UFC/OSHA Class II combustible liquid.

SECTION FIVE – HEALTH HAZARD DATA

CARCINOGENICITY: NTP: No **IARC:** No **OSHA:** No

PRIMARY ROUTE OF ENTRY: Inhalation

SYMPTOMS OF HEAVY ACUTE AND/OR PROLONGED EXPOSURE: Redness of eyes and/or skin.
SKIN: Prolonged exposure may cause defatting or redness. **EYE:** Is an irritant. **INGESTION:** Small amounts are not likely to cause injury. Large amounts can be unwholesome to eat and medical attention should be sought promptly.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting contact-site disorders.

Emergency First Aid: For Eyes and Skin: Flush with water for 15 minutes. Get medical attention if necessary.
INGESTION: Give 2 glasses of water and summon medical attention.

SECTION SIX – REACTIVITY DATA

STABILITY: STABLE **CONDITIONS TO AVOID:** NONE

INCOMPATABLE MATERIALS TO AVOID: Alkaline materials, oxidizers or oxidizing materials and strong acids.

HAZARDOUS POLYMERIZTION: Will not occur. **CONDITIONS TO AVOID:** None

HAZARDOUS DECOMPOSITON: From combustion: Smoke, carbon dioxide, unknown organic compounds.

SECTION SEVEN – ENVIROMENTAL PROTECTION PROCEDURES

SPILL RESPONSE: Small spill pick up with absorbent media. Store as INDUSTRIAL waste. Large Spills: Contain with dikes, pick up with vacuum or absorbent and transfer to clean container for disposal. Handle as INDUSTRIAL waste. Notify proper local, state and federal authorities.

WASTE DIPOSAL METHOD: Dispose of in accordance with Local, State and Federal regulations.

SECTION EIGHT – SPECIAL PROTECTION INFORMATION

EYE PROTECTION: CHEMICAL GOGGLES OR FULL FACE SHIELD. SKIN PROTECTION: RUBBER OR VINYL GLOVES

RESPIRATORY PROTECTION: Not normally needed if used in accordance to label directions.

VENTILATION RECOMMENDATION: Local Exhaust: Not normally indicated Special: Not necessary. Mechanical: Not normally indicated. Other: Normal indoor ventilation.

OTHER PRECAUTIONS: Long pants and sleeves. Always consider an apron.

SECTION NINE – SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Store in cool, ventilated area, away from ignition sources. Store away from oxidizers or materials being a yellow "D.O.T" label. Store away from acids.

OTHER PRECAUTIONS: Clean up leaks/spills immediately to prevent soil or water contamination.

SECTION TEN – TRANSPORTATION INFORMATION

D.O.T Shipping Name: Cleaning Liquid-Flammable

D.O.T hazard Class: 3 Flammable

UN/IDENTIFICATION NUMBER: NA1993 PGIII

D.O.T Label Non-regulated in non-bulk quantity

ENVIRONMENTAL NOTES: Sara 313 – reportable ingredients are not present.

The exact composition of this material is a trade secret.

DISCLAIMER OF LIABILITY:

The manufacturer and seller warrants that this product conforms to its standard specifications when used according to directions. As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for use of this product. Information contained hereinafter is believed to be true and accurate but all statements or suggestions are made without any warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material and the results to be obtained from the use thereof.

COASTWIDE LABORATORIES
Formerly Paulsen & Roles Laboratories
10000 SW Commerce Circle
Wilsonville, OR 97070
Office PHONE: 503-416-5300 or FAX 503-416-5301
24-HR EMERGENCIES: MEDICAL 800-808-4691

Hazard Rating	HMIS	NFPA
Health	2	2
Flammability	1	1
Reactivity	0	0
Special	None	None

DOT CHEMTREC: 800-424-9300

MATERIAL SAFETY DATA SHEET

Complies with ANSI Z400.1 Format

SECTION 1: PRODUCT IDENTIFICATION

Product: ORANGE WATERLESS™ **MSDS CODE:** CL3470.0700

GENERIC DESCRIPTION	DATE ISSUED	SUPERSEDES	PREPARED BY
Special Purpose Cleaner	7-1-00	1-15-97	Roger McFadden, Chemist

SECTION 2: COMPOSITION AND INFORMATION ON INGREDIENTS

Components*	% by Wt.	CAS #	Exposure Limit
Nonionic Surfactant	05-10	26027-38-3	None
Beta-Pinene	08-12	12172-67-3	None
Citrus Distillate	80-90	5989-54-8	None

*There are no components in this product that are currently reportable in either SARA Title III: Sections 313, 40 CFR part 372 or the California Proposition 65 requirements.

NA = Not applicable NSR = No Special Requirements ND = Not Determined PEL = OSHA TLV-TWA = ACGIH

SECTION 3: HAZARD IDENTIFICATION

Primary Entry Routes: Skin and eyes. **Signs & Symptoms of Exposure: INHALATION**: Prolonged exposure to vapors may cause mucous membrane irritation. **EYE CONTACT**: Liquid and mist may irritate the eyes. **SKIN CONTACT**: May dry out the skin. Prolonged contact may irritate the skin. **INGESTION**: Large quantities may cause stomach pain, irritation of mouth and throat. Swallowing may cause vomiting.
Effects of Overexposure: Headaches and vomiting.

SECTION 4: FIRST AID MEASURES

Emergency First Aid Procedures: INHALATION: Remove to fresh air. Get medical attention. Give artificial respiration if not breathing. **EYE CONTACT**: Immediately flush eyes with water for 15 minutes, lifting eyelids occasionally. Get immediate medical attention. **SKIN CONTACT**: Immediately wash skin with soap and water. Remove contaminated clothing and shoes. Wash before reuse. **INGESTION**: Do not induce vomiting. Get immediate medical attention. **24-HR MEDICAL EMERGENCY PHONE: 800-808-4691**

SECTION 5: FIRE FIGHTING MEASURES

Flash Point: 199F SFCC **Flammable Limits:** ND **Extinguishing Media:** Foam. CO2. Dry Chemical. Water Fog.
Special Fire Fighting Procedures: Fire fighters should wear self contained breathing apparatus (SCUBA) and full protective clothing. Use water spray to cool nearby containers and structures exposed to fire.
Unusual Fire and Explosion Hazards: Container may burst in the heat of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Release or Spill: Absorb with diatomaceous earth or similar inert material. Sweep or scrape up and containerize. Rinse affected area thoroughly with water. Wear or use appropriate protective equipment. All Federal, State and Local regulations should be carefully followed.

SECTION 7: HANDLING AND STORAGE

Keep out of reach of children. Store in a cool, dry place with adequate ventilation. Keep from freezing. Wash thoroughly after handling. Empty container may contain small amounts of undiluted product. Be certain to dispose of according to all regulations.

COASTWIDE Laboratories
Material Safety Data Sheet
Page 2 - **ORANGE WATERLESS™** CL3470.0700

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Respiratory Protection: No special requirements under normal use conditions. Maintain adequate ventilation when using in confined areas.
Protective Gloves: No special requirements for normal use conditions.
Eye Protection: Wear splash-proof goggles for undiluted product. No special requirements for normal use conditions. However, it is a good safe practice to wear eye protection when using any chemical product.
Other Protective Measures: Use good personal hygiene practices. Launder contaminated clothing/equipment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor: Clear liquid, citrus odor **Boiling Point:** 212F **Evap. Rate:** NA **pH:** NA
Vapor Density: ND **Vapor Pressure:** NA **Specific Gravity:** 0.930 **Solubility in Water:** Nil **%Volatile:** 100

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable **Conditions to Avoid:** None known to COASTWIDE **Incompatibility:** None known to COASTWIDE
Hazardous Decomposition Products: None known to COASTWIDE.
Hazardous Polymerization: Will not occur. **Conditions to Avoid:** None known to COASTWIDE.

SECTION 11: TOXICOLOGICAL INFORMATION

Oral Toxicity: Non-toxic based upon current information available to COASTWIDE.

SECTION 12: ECOLOGICAL INFORMATION

Contains no phosphates. Contains no water.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Information: No special method. Observe all applicable Federal, State and Local regulations, rules and/or ordinances regarding disposal of non-hazardous materials.

SECTION 14: TRANSPORT INFORMATION

DOT EMERGENCY 24-HR: (800) 424-9300 **DOT Class:** Not Regulated

SECTION 15: REGULATORY INFORMATION

SARA Title III Section 313 and 40 CFR Part 372 Notification:
No ingredients in this product are currently listed as carcinogens by NTP, IARC or OSHA. All components of this product are listed or are excluded from listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

SECTION 16: OTHER INFORMATION

Always follow label directions carefully when using this or any other chemical product. If information about this product is required, please contact COASTWIDE Laboratories at 503-416-5300. Keep MSDSs filed and organized in an area accessible to workers according to the Hazard Communication Standards.

All information appearing herein is given in good faith. No warranty is made, expressed or implied including merchantability or fitness for a particular purpose. All conditions of use are beyond the control of COASTWIDE Laboratories. Therefore, users are responsible for verifying the data under their own operating conditions to determine whether the product is suitable for their particular purposes. The data contained herein is confidential and intended solely for the user's internal use.

MATERIAL SAFETY DATA SHEET

1.0 PRODUCT AND COMPANY IDENTIFICATION

Product Name: ECOgent Universal Cleaner Concentrate

Product Use: Cleaner

Manufacturer/Supplier: Cogent Environmental Solutions

Address: 18 Massari Street
Caledon, ON L0N 1C0
Phone #: (519) 927-3793

2.0 INFORMATION ON INGREDIENTS*

Ingredients	CAS#	Wt%	OSHA-PEL	ACGIH-TLV	LD_{50}	LC_{50}
2-Hydroxypropanoic acid	50-21-5	3-7	Not available	Not available	3730 mg/kg oral, rat	Not available
Alkyl polyglycoside	110615-47-9	1-5	Not available	Not available	> 5000 mg/kg oral, rat	Not available
Glucopyranose, oligomeric, decyl octyl glycosides	68515-73-1	1-5	Not available	Not available	> 5000 mg/kg oral, rat	Not available

* No pesticides or preservatives
* All ingredients are derived from renewable or regrowable sources.

3.0 HEALTH HAZARDS IDENTIFICATION

Calculated Oral LD_{50}: 12526 mg/kg
Calculated Dermal LD_{50}: >2000 mg/kg

Route of Entry: Eye, Skin contact, Ingestion
Effects of Acute Exposure:
Eye: Direct contact may cause mild irritation.
Ingestion: Ingestion of large amounts may cause stomach distress, nausea or vomiting.

Effects of Chronic Exposure:
Skin: None known to us at this time.
Irritancy: Non-hazardous by WHMIS/OSHA criteria.
Respiratory Tract Sensitization: No data available.
Carcinogenicity: Non-hazardous by WHMIS/OSHA criteria.
Teratogenicity, Mutagenicity, Reproductive Effects: No data available.
Synergistic Materials: Not available.

4.0 FIRST AID MEASURES

Eye: Flush with water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention if irritation persists.
Skin: Not a normal route of harmful exposure. Flush with water. Wash with soap and water. Obtain medical attention if irritation persists.
Inhalation: Not a normal route of exposure. If symptoms develop, move victim to fresh air. If symptoms persist, obtain medical attention.
Ingestion: Do not induce vomiting. Rinse mouth with water, then drink one glass of water. Obtain medical attention or call a poison-control center immediately. Never give anything by mouth if victim is unconscious, is rapidly losing consciousness or is convulsing.

5.0 FIRE FIGHTING MEASURES

Flammability: Not flammable
Flash Point (deg F/C, TCC): None **LEL:** Not applicable **UEL:** Not applicable
Hazardous Combustion Products: May include and are not limited to oxides of carbon.
Means of Extinction: Treat for surrounding material.
Special Fire Hazards: Fire fighters should wear self-contained breathing apparatus.

6.0 ACCIDENTAL RELEASE MEASURES

Leak and Spill Procedure: Before attempting cleanup, refer to hazard data given above. Flush into sewage system in accordance with local regulations.

ECOgent Universal Cleaner Concentrate

7.0 HANDLING AND STORAGE

Storage and Handling Requirements: Keep out of reach of children. Store in a closed container away from incompatible materials.

8.0 EXPOSURE CONTROLS/PERSONAL PROTECTION

Gloves: Although not considered a skin irritant under WHMIS, rubber gloves may be advisable.
Eye Protection: Safety glasses.
Respiratory Protection: Not normally required.
Other Protective Equipment: As required by employer code.
Engineering Controls: General ventilation normally adequate.

9.0 PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (deg F/C): Not available
% Volatile (Wt %): Not available
Solubility in Water: Not available
Physical State: Liquid
Appearance; Odour: Clear, colourless; citrus scent
Specific Gravity (H_2O = 1): Not available
Evaporation Rate (H_2O = 1): Not available
pH (as supplied): 5
Viscosity: Not available
Odour Threshold (ppm): Not available

10.0 STABILITY AND REACTIVITY

Conditions for Chemical Instability: Stable.
Incompatible Materials: Acids, oxidizers.
Conditions for Reactivity: Not available.
Hazardous Decomposition Products: May include and are not limited to oxides of carbon when heated to decomposition.

11.0 DISPOSAL CONSIDERATIONS

Review federal, state/provincial and local government requirements prior to disposal.

12.0 TRANSPORTATION

T.D.G./D.O.T. Classification: Not regulated.

13.0 REGULATORY INFORMATION

Occupational Health and Safety Regulations:
WHMIS Class: Not controlled
OSHA & WHMIS: MSDS prepared pursuant to the Hazard Communication Standard (CFR29 1910.1200) and Canadian WHMIS regulations (Controlled Products Regulations under the Hazardous Products Act).

Environmental Regulatory Lists:
SARA - Section 313 (Toxic Chemical Release Reporting) 40 CFR 372 – No ingredients require reporting.
Toxic Substances Control Act (TSCA) - All the ingredients are listed on the Chemical Substance Inventory or exempt.
California Proposition 65 - None of the ingredients are listed.
New Jersey Right to Know Hazardous Substance List: None of the ingredients are listed.
New York Community Right to Know Law: None of the ingredients are listed.
Pennsylvania Hazardous Substance List: None of the ingredients are listed.
Canadian Domestic Substance List (DSL) - All the ingredients are listed or are in the process of being listed on the DSL.

14.0 PREPARATION INFORMATION

Date: Dec. 2002
Telephone: 519-927-3793
MSDS Prepared by: Updated by Cogent Environmental Solutions

Material Safety Data Sheet

MEDICAL EMERGENCY ONLY: 1-800-255-3924

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	R-109 Delco Red Truck Wash Powder
PRODUCT DESCRIPTION:	GENERAL PURPOSE HIGH PRESSURE WASHER POWDER DEGREASER DETERGENT
DATE PREPARED:	JUNE 22, 1998
SUPPLIER NAME AND ADDRESS:	DELCO CLEANING SYSTEMS OF FT. WORTH 2513 WARFIELD STREET, FT. WORTH, TEXAS 76106-7554
SUPPLIER PHONE:	U.S./CANADA WATS: 800-433-2113, FAX: 817-625-2059, LOCAL: 817-625-4213
SUPPLIER EMAIL:	email: delco@dcs1.com ,
SUPPLIER URL:	URL: http://www.dcs1.com/del
EMERGENCY PHONE:	CHEM-TEL, INC. 800-255-3924 (24 HOURS)

HEALTH HAZARD DATA - LEAST = 0; SLIGHT = 1; MODERATE = 2; HIGH = 3; EXTREME = 4

1.3 HAZARD RATING: ACUTE HEALTH - 1; FIRE - 0; REACTIVITY - 0

FOR ACUTE AND CHRONIC HEALTH EFFECTS REFER TO THE DISCUSSION IN SECTION 7.

2.0 HAZARDOUS COMPONENTS/

			TLV(MG/M3)	
	CAS#	%	PEL	OTHER
2.1 SODIUM METASILICATE, PENTA.	6834-92-0	<15	NONE	UNK
2.2 CLYCOL ETHER EB	111-76-2	<4	25 PPM	UNK

THIS PRODUCT CONTAINS NO OTHER COMPONENT CONSIDERED HAZARDOUS ACCORDING TO THE CRITERIA OF 29 CFR 1910.1200.

3.0 PHYSICAL DATA/

3.1 APPEARANCE AND ODOR: RED POWDER WITH EB ODOR
3.2 SOLUBILITY IN WATER: COMPLETE
3.3 PH: 100% = 10.5 TO 11.5
3.4 BOILING POINT: UNK SPECIFIC GRAVITY: 7.84 LBS PER GAL.
3.5 VAPOR DENSITY: UNK EVAPORATION RATE: UNK

4.0 FIRE AND EXPLOSION DATA/

4.1 SPECIAL FIRE HAZARDS: NONE
STANDARD AGENTS
4.2 FIRE FIGHTING METHODS:
4.3 FLASH POINT: UNK
4.4 FLAMMABLE LIMITS - LOWER: UNK UPPER: UNK

5.0 REACTIVITY DATA/

5.1 STABILITY: STABLE UNDER NORMAL CONDITIONS OF HANDLING
5.2 CONDITIONS TO AVOID: HIGH MOISTURE WILL HARDEN COMPOUND

6.0 SPILL OR LEAK PROCEDURES/

USE PROPER PROTECTIVE EQUIPMENT

6.1 CLEANUP:

MAXIMIZE VENTILATION. DIKE OR DAM LARGE SPILLS. RECOVER IF POSSIBLE. ADD ADSORBENT MATERIAL TO SOAK UP LIQUID. RINSE AREA THOROUGHLY WITH WATER.

6.2 WASTE DISPOSAL:

CONSULT STATE AND LOCAL AUTHORITIES FOR RESTRICTIONS ON DISPOSAL OF CHEMICAL WASTE.

7.0 HEALTH HAZARD DATA/ DANGER

7.1 EFFECTS OF OVEREXPOSURE:

EYES: CAUSES IRRITATION, LOSS OF NATURAL LUBRICATION.

SKIN: PROLONGED CONTACT MAY DEFAT SKIN, LEADING TO IRRITATION AND DERMATITIS.

IF SWALLOWED: HARMFUL IF SWALLOWED.

IF INHALED:

MAY IRRITATE MUCOSAL MEMBRANES. UNDER RECOMMENDED CONDITIONS, VAPOR LEVEL WILL BE TOO LOW TO PRESENT INHALATION HAZARD.

8.0 FIRST AID/

8.1 EYES:

FLUSH EYES IMMEDIATELY WITH PLENTY OF COOL RUNNING WATER. REMOVE CONTACT LENSES. CONTINUE FLUSHING FOR 15 MINUTES HOLDING EYE LIDS OPEN.

8.2 SKIN:

FLUSH SKIN WITH PLENTY OF COOL RUNNING WATER. WASH THOROUGHLY WITH SOAP AND WATER.

8.3 IF SWALLOWED:

RINSE MOUTH; THEN DRINK 1 OR 2 LARGE GLASSES OF WATER. DO NOT INDUCE VOMITING. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

8.4 IF INHALED:

MOVE IMMEDIATELY TO FRESH AIR; IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN.

IF SWALLOWED OR IN CASE OF PERSISTENT EYE OR SKIN IRRITATION, CALL A POISON CONTROL CENTER OR PHYSICIAN IMMEDIATELY.

9.0 SPECIAL PROTECTION INFORMATION /

9.1 EYES: SPLASHPROOF GLASSES.

9.2 SKIN: RUBBER GLOVES RECOMMENDED.

10.0 ADDITIONAL INFORMATION/PRECAUTIONS /

10.0 DOT CLASS: 55 NOT REGULATED

KEEP OUT OF REACH OF CHILDREN

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT WITH RESPECT TO THE FORMULA USED TO MANUFACTURE THE PRODUCT. AS DATA, STANDARDS AND REGULATIONS CHANGE, AND CONDITIONS OF USE AND HANDLING ARE BEYOND OUR CONTROL, NO WARRANTY, EXPRESS OR IMPLIED, IS MADE AS TO THE COMPLETENESS OR CONTINUING ACCURACY OF THIS INFORMATION.

Abbreviations:

UNK = UNKNOWN AT THIS TIME

TLV = THRESHOLD LIMIT VALUE

C = CEILING LIMIT, NOT TO BE EXCEEDED

PEL= PERMISSIBLE EXPOSURE LIMIT

STEL = SHORT TERM EXPOSURE LEVEL

For the latest update of this MSDS go to: http://www.dcs1.com/msds/r-109.html

Material Safety Data Sheet EaCo CHEM Inc.

SECTION:1 SUPPLIER INFORMATION

Common Name:	C TAR MELT
Product Use:	Tar Remover
Manufacturer:	EaCo CHEM Inc.
Address:	765 Commerce Ave New Castle PA 16101
Emergency Phone:	800-255-3924
Date Prepared:	6-5-99 Updated: 6/13/07
DOT CLASSIFICATION:	Compounds, cleaning liquid Not regulated by the DOT Non Hazardous Liquid

SECTION:2 HAZARDOUS INGREDIENTS

CHEMICAL NAME	OSHA/PEL	ACGIH/TLV	CAS. NO.
Petroleum Hydrocarbon	N/E	N/E	8052-41-3
Ethylene glycol n-butyl ether	N/E	N/E	111-76-2

Note: N/E = Not established

SECTION:3 HAZARDS IDENTIFICATION

Routes of entry:	Eyes, Skin, Ingestion, Inhalation
Health Hazards:	N.A.
Chemical listed as carcinogen:	NO
Or potential carcinogen:	NO
National Toxicology Program:	NO
I.A.R.C. MONOGRAPHS:	NO
OSHA:	NO

Signs and symptoms of exposure: Eye and skin irritation.
Medical conditions generally aggravated by exposure: Dermatitis, irritation to eyes and throat and nose irritation to the digestive tract.

SECTION:4 EMERGENCY AND FIRST AID PROCEDURES

EYES:	Flood with water for 15 minutes. If irritation persists, call physician.
SKIN:	Wash off with soap and water. If irritation persists, call physician.
INGESTION:	Do not induce vomiting, Seek immediate medical attention.
INHALATION:	Remove to fresh air.

SECTION:5 FIRE FIGHTING MEASURES

Flash Point and Method:	>125°F (T.C.C.)
Hazardous decomposition products:	N/A
Conditions of Flammability:	Auto ignition 400°F
Means of extinction:	Water, Dry chemical, Foam, Co2
Special Procedures:	Closed containers exposed to fire may be cooled with water to room temperature.

SECTION:6 PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken if material is released or spilled: Large or small spill: avoid sources of ignition, insure good ventilation, if volume is significant transfer into containers for disposal. Absorb on inert ingredient such as vermiculite. Notify fire authorities and appropriate Federal state or local agencies.
Waste Disposal Method: Immediate cleanup of any spill is recommended. Prevent material from entering sewers, storm drains, waterways
Precautions to be taken in handling and storage: Store in a cool dry place away from excessive heat. Use non sparking tools and explosion proof equipment.
Other Precautions: If product is near a fire or gets excessively hot, cool with water then vent until temperature becomes normal. Secure the bung when cooled.

SECTION:7 CONTROL MEASURES

Expiratory Protection:	None needed if exposure limits are not exceeded.
Ventilation:	Local exhaust to maintain TLV.
Other:	Not required.
Protective Gloves:	Yes
Goggles:	Yes
Other protective clothing or equipment:	Normal work clothes covering arms and legs.
Work/Hygiene practices:	Keep off skin and clothing. Wash clothing before reuse.

SECTION:8 PHYSICAL AND CHEMICAL PROPERTIES

Appearance - Odor:	Water white color characteristic hydrocarbon odor.
Physical State:	Liquid
pH:	7.5
Vapor Pressure (mmHg):	N/A
Vapor Density (air=1):	N/A
Boiling Point:	N/A
Freezing/Melting Point:	N/A
Specific Gravity (Water =1):	0.850
Evaporation Rate:	N/A
Solubility in water:	Negligible

SECTION:9 STABILITY AND REACTIVITY

Stability:	Stable. Avoid high heat.
Incompatibility (materials to avoid):	Strong oxidizing or reducing agents.
Hazardous decomposition:	None known.
Hazardous polymerization:	Will not occur.

SECTION:10 HAZARD RATING

HEALTH	1	4 = EXTREME
FIRE	2	3 = HIGH
REACTIVITY	0	2 = MODERATE
PERSONAL PROTECTION	B*	1 = SLIGHT
		0 = INSIGNIFICANT

B* = Gloves and goggles.

NOTICE: This product has been classified in accordance with the hazard criteria of the CFR and the MSDS contains all the information required by the CFR.

DISCLAIMER: The information herein is given in good faith, but no warranty, either expressed or implied is made. Final determination of the suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein we cannot be sure or guarantee these are the only hazards which exist.

Material Safety Data Sheet
ELECTRON

Environmentally Preferred Dielectric Solvent

Rev. 06/06/2007

2177A Flintstone Drive
TUCKER, GA 30084
www.ecolink.com
email: info@ecolink.com
800/886-8240 or
770/621-8240 (9–5 EST)

FOR CHEMICAL EMERGENCY
Call INFOTRAC
800/535-5053 (24 HOURS)

Section I: Product Identification

Product name:	ELECTRON
Synonym:	Proprietary Blend
Molecular Formula:	Proprietary Blend

The "Plain English" Section

Material Safety Data Sheets can be confusing. Federal law requires us to print a great deal of technical information, which probably won't help the non-scientist. ECOLINK includes this "PLAIN ENGLISH" section, written to address the questions and concerns of the average person. If you have additional health, safety or product questions, don't hesitate to call us at 800/886-8240.

Health Hazards: ELECTRON is a non-halogenated industrial chemical. We call it "environmentally preferred" because it is intended to replace products that are more hazardous, (1,1,1 trichloroethane, mineral spirits, MEK, etc.). This does not mean that ELECTRON is completely harmless. It is strong enough to remove tough industrial soils, so it can irritate your skin. We suggest you wear gloves, and avoid extended exposure to unprotected skin. Don't get it in your eyes, or breath large amounts of the vapor, (it will dry out your nasal passages). Used on a rag or from a spray bottle, the product won't produce fumes in any great quantity, (don't spray ELECTRON under high pressure without adequate ventilation). For more exposure and first aid information, refer to MSDS Sections II, VI.

Flashpoint: ELECTRON's flashpoint is 147° F. This represents the temperature that the liquid must reach before it emits fumes that will ignite. This is pretty hot, so combustion in ordinary use isn't a big concern. If ELECTRON is used on rags, the rags can ignite if exposed to an open flame because the solvent is "wicked" onto the cloth. Be sure to dispose of rags in an airtight container specifically designed to prevent spontaneous combustion. Don't use ELECTRON or any other combustible solvent around welding or any other hot work area.

Disposal: Straight from the drum, ELECTRON is **not** considered a hazardous waste product. Once it is contaminated with whatever you are cleaning, the resulting mixture may fall under a hazardous classification, depending on whether or not the material you are cleaning is hazardous. If you aren't sure how to dispose of used ELECTRON, give us a call and we will help you make the right decisions.

Section II: Chemical or Hazardous Components

Chemical Name	Citrus Terpene
CAS No.	68647-72-3
Approx. wt.%	>10%
Exposure	(*) TLV – 100 ppm
Chemical Name	Severely Hydrotreated Light Distillates
CAS No.	64742-47-8
Approx. wt. %	>75%
Exposure	(*) PEL – 100 ppm

(*) Manufacturer's recommended exposure limits.

ALL MATERIALS IN PRODUCT ARE TSCA LISTED

RCRA REGULATED:	No
CERCLA (superfund):	Not Applicable
DOT regulated:	No
DOT haz. class:	Not applicable
DOT Shipping Name:	Not applicable
DOT number:	Not Applicable

(Questions concerning DOT information refer to DOT manual CFR 49, chapter 1, 10/96 edition)

Section III: Physical Data

Appearance & Odor:	Colorless liquid with mild citrus terpene odor
Boiling Point:	349° F. @ 760 mmHg
Evaporation Rate:	<1.0
Percent Volatile:	100%
Solubility In Water:	Negligible
Specific Gravity:	0.8112
VOC Content	810 gm/l
	122 gm/l less exempt compounds
Vapor Density (AIR=1):	>1
Vapor Pressure:	0.30 mmHg @ 68°F

Section IV: Fire and Explosion Hazard Data

Flash Point (Method):
Bulk Liquid (TCC) 147° F

Flammable Limits:
LEL 0.7%
UEL 7.0%

Extinguishing Media:
Regular foam, water fog, carbon dioxide, dry chemical, Class B.

Special Fire Fighting Procedures:
Keep fire exposed containers cool with water. Fire fighters should wear self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode with appropriate gear and chemical resistant personal protective equipment.

Unusual Fire & Explosion Hazards:
Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat, pilot lights, other flames and ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product can ignite explosively.

Section V: Reactivity Data

Stability: Stable

Conditions to Avoid:
Sources of ignition such as sparks, hot spots, welding, flames and cigarettes. Ignition/flash may result if concentration of product is in the flammable range. (See section IV for LEL and UEL values.)

Incompatibility (Materials to Avoid):
Strong oxidizing agents and/or strong acids.

Hazardous Decomposition:
May form carbon dioxide and carbon monoxide.

Hazardous Polymerization:
Will not occur.

Section VI: Health Hazard Data

Primary Routes of Exposure:
Oral, Inhalation, & Skin

Ingestion:
Swallowing large amounts may be harmful by causing gastrointestinal irritation.

Inhalation:
Breathing large amounts may be harmful by causing nose, throat, and respiratory tract irritation.

Eyes:
Irritant. Liquid contact will irritate eyes and may cause stinging, tearing, and redness.

Skin or Contact:
May cause mild irritation of redness and burning.

First Aid:

Ingestion:	Seek medical attention immediately. If individual is drowsy or unconscious, do not give anything by mouth; place individual on left side with head down. Contact medical facility or poison Control center for advice on whether to induce vomiting.
Inhalation:	Remove to fresh air. If breathing is difficult, give oxygen. Keep person warm and quiet. Seek medical attention.
Eyes:	Irrigate immediately with water for at least 15 minutes. Get medical attention if irritation persists.
Skin:	Wash with soap and water. Thoroughly clean contaminated clothes and shoes before re-use. If symptoms persist, seek medical attention.

Toxicity Data:

Acute Toxicity:	Oral Toxicity (mice) – LD_{50} 5.6–6.6 g/kg
Skin Toxicity:	Absorption (rabbits) – LD_{50} >5000 mg/kg
Carcinogen:	NTP – Not Listed IARC Monographs – None OSHA REGS – Not Regulated

Section VII: Precautions for Safe Handling

HMIS Information:
Health – 1 / Reactivity – 0
Flammability – 2 Personal Protection – B

HMIS Definition:
0 – Minimal, 1 – Slight, 2 – Moderate, 3 – Serious, 4 –Extreme
"/" in the Health Category denotes material does not target any major organs.
"*" in the Health Category denotes material may target certain organs.

Eye Protection
Safety glasses and splash protection required.

Protective Gloves:
Nitrile gloves.

Respiratory Protection:
Not required under conditions of normal use. If vapor mist is present, use NIOSH certified organic vapor mask.

Ventilation: Local exhaust/hood or fan may be used.

Other Protective Clothing: None required under normal use.

Work Practices: Store rags used with this material in an airtight, metal container to prevent spontaneous combustion. Treat this chemical with respect and follow all MSDS instructions.

Section VIII: Control Measures

Small Spill: Absorb liquid on vermiculite, floor absorbent, or other absorbent material and transfer to hood.

Large Spill: Eliminate all ignition sources, (flares, flames including pilot lights, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent from entering drains, sewers, streams, etc. If runoff occurs, notify authorities as required. Pump or vacuum transfer spilled product to clean containers for recovery. Transfer contaminated, absorbent soil and other materials to containers for disposal.

Waste Disposal Method: ELECTRON is to be disposed of according to local, state, and federal regulations. Please call us if you need additional disposal information.

Precautions To Be Taken In Handling & Storing: Since empty containers contain product residues, all hazard precautions given in the material safety data sheet must be observed. All metal pails or drums should be grounded and/or bonded when material is transferred. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperatures may result in ignition.

Other Precautions: Keep this and all chemicals out of the reach of children.

Section IX: Part Number & Packaging

Product Name	Part No.	Packaging	NSN Number
Electron	0296-55	55 Gal Drum	6850-01-375-5555
Electron	0296-5	5 Gal Pail	6850-01-375-5553
Electron	0296-1	4x1 Gal BX	6850-01-375-5554
Electron	049-1	12 x 22 oz	6850-01-371-8049
Electron	0164-1	12 Pt BX	N/A

DISCLAIMER: Ecolink, Inc. believes the information contained herein is accurate. However, Ecolink makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained by the use thereof. Ecolink, Inc. assumes no responsibility for injury from the use of the product described herein.

END OF MSDS

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INLAND TECHNOLOGY -- TEKSOL EP - CLEANING COMPOUND,SOLVENT
MATERIAL SAFETY DATA SHEET
NSN: 6850013780583
Manufacturer's CAGE: 0K209
Part No. Indicator: A
Part Number/Trade Name: TEKSOL EP
==========================================================================
                            General Information
==========================================================================
Item Name: CLEANING COMPOUND,SOLVENT
Company's Name: INLAND TECHNOLOGY INC
Company's Street: 401 EAST 27TH ST
Company's City: TACOMA
Company's State: WA
Company's Country: US
Company's Zip Code: 98421
Company's Emerg Ph #: 206-922-8932
Company's Info Ph #: 206-922-8932
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 13OCT94
Safety Data Review Date: 27JUN96
Supply Item Manager: CX
MSDS Serial Number: BSGKN
Hazard Characteristic Code: F4
Unit Of Issue: CN
Unit Of Issue Container Qty: 5 GALLONS
Type Of Container: CAN
Net Unit Weight: 32.1 LBS
==========================================================================
                     Ingredients/Identity Information
==========================================================================
Proprietary: NO
Ingredient: HYDROTREATED HEAVY NAPHTHA/C10-C11 PARAFFINIC HYDROCARBONS
Ingredient Sequence Number: 01
Percent: UNKNOWN
NIOSH (RTECS) Number: 1002859HN
CAS Number: 64742-48-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED
--------------------------------------
Proprietary: NO
Ingredient: D-LIMONENE
Ingredient Sequence Number: 02
Percent: UNKNOWN
NIOSH (RTECS) Number: GW6360000
CAS Number: 5989-27-5
OSHA PEL: NOT ESTABLISHED.
ACGIH TLV: NOT ESTABLISHED.
Other Recommended Limit: NONE RECOMMENDED
==========================================================================
                     Physical/Chemical Characteristics
==========================================================================
Appearance And Odor: CLEAR WITH MILD CITRUS ODOR.
Boiling Point: 310F,154C
```

Vapor Pressure (MM Hg/70 F): <10MMHG
Vapor Density (Air=1): >4
Specific Gravity: 0.77
Evaporation Rate And Ref: 0.3 (N-BUTYL ACETATE=1)
Solubility In Water: NOT WATER SOLUBLE
Percent Volatiles By Volume: 100

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Fire and Explosion Hazard Data

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Flash Point: 112F,44C
Flash Point Method: PMCC
Lower Explosive Limit: 0.6
Upper Explosive Limit: 7
Extinguishing Media: FOAM, WATER SPRAY, DRY CHEMICAL, CARBON DIOXIDE.
Special Fire Fighting Proc: USE AIR SUPPLIED BREATHING EQUIPMENT FOR ENCLOSED AND CONFINED SPACES OR AS OTHERWISE NEEDED.
Unusual Fire And Expl Hazrds: NONE KNOWN.

==========

Reactivity Data

==========

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: AVOID CONTACT WITH STRONG ACIDS AND STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: OXIDES OF CARBON AND HYDROCARBONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

==========

Health Hazard Data

==========

LD50-LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE-PRODUCT CONTACTING THE EYE MAY CAUSE EYE IRRITATION. LOW ORDER ACUTE ORAL AND DERMAL TOXICITY. CHRONIC-PROLONGED OR REPEATED SKIN EXPOSURE CAN LEAD TO MILD IRRITATION, DEFATTING AND DERMATITIS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE KNOWN.
Signs/Symptoms Of Overexp: NONE SPECIFIED BY MANUFACTURER.
Med Cond Aggravated By Exp: SKIN CONTACT MAY AGGRAVATE EXISTING DERMATITIS.
Emergency/First Aid Proc: EYES-IF EYE CONTACT OCCURS, FLUSH WITH WATER FOR AT LEAST 15 MIN OR UNTIL IRRITATION SUBSIDES. IF IRRITATION PERSISTS, CALL DOCTOR. SKIN-IN CASE OF SKIN CONTACT, REMOVE ANY CONTAMINATED CLOTHING & WASH SKIN THOROUGHLY WITH SOAP & WATER. INHALATION-IF OVERCOME BY VAPOR, REMOVE FROM EXPOSED AREA & CALL PHYSICIAN IMMEDIATELY. INGESTION-DO NOT INDUCE VOMITING. CALL PHYSICIAN IMMEDIATELY.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: SHUT OFF AND ELIMIATE ALL IGNITABLE SOURCES. CONTAIN AND COLLECT MATERIAL. ABSORB RESIDUE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: CONTACT FEDERAL, STATE, COUNTRY OR LOCAL
ENVIRONMENTAL REGULATORY AGENCIES FOR GUIDANCE.
Precautions-Handling/Storing: USE AND STORE AWAY FROM HEAT, SPARKS AND
OPEN FLAMES. KEEP CONTAINER SEALED WHEN NOT IN USE.
Other Precautions: READ AND UNDERSTAND ALL CAUTIONS, LABELS AND MSDS
BEFORE USING ANY CHEMICAL PRODUCT.

========== Control Measures ==========

Respiratory Protection: NONE NORMALLY REQUIRED.
Ventilation: USE MECHANICAL VENTILATION WHENEVER PRODUCT IS USED IN
CONFINED SPACE, IS HEATED ABOVE AMBIENT TEMPERATURE OR IS AGITATE
Protective Gloves: USE CHEMICAL RESISTANT GLOVES, IF NEEDED
Eye Protection: SPLASH GOGGLES/FACE SHIELD.
Other Protective Equipment: NONE NORMALLY REQUIRED.
Work Hygienic Practices: MINIMIZE BREATHING OF VAPOR OR MIST. AVOID
PROLONGED OR REPEATED CONTACT SKIN
Suppl. Safety & Health Data: WASH CONTAMINATED CLOTHING BEFORE RESUE. KEEP
ALL CHEMICALS OUT OF THE REACH OF CHILDREN.

========== Transportation Data ==========

Trans Data Review Date: 98028
DOT PSN Code: DOR
DOT Symbol: D
DOT Proper Shipping Name: COMPOUNDS, CLEANING LIQUID
DOT Class: 3
DOT ID Number: NA1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IMO Subsidiary Risk Label: -
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
AFI Class: 3
AFI ID Number: UN1993
AFI Pack Group: III
AFI Basic Pac Ref: 7-7
N.O.S. Shipping Name: CONTAINS D-LIMONENE

========== Disposal Data ==========

========== Label Data ==========

Label Required: YES
Technical Review Date: 21JUN94
Label Status: F

Common Name: TEKSOL EP
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-None: X
Contact Hazard-Slight: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: **TARGET ORGAN(S):SKIN, EYES, RESPIRATORY SYSTEM, CNS** PRODUCT CONTACTING THE EYES MAY CAUSE EYE IRRITATION. LOW ORDER ACUTE ORAL AND DERMAL TOXICITY. PROLONGED OR REPEATED SKIN EXPOSURE CAN LEAD TO MILD IRRITATION, DEFATTING AND DERMATITIS. USE AND STORE AWAY FROM HEAT, SPARKS AND OPEN FLAME. KEEP CONTAINER SEALED WHEN NOT IN USE. IN CASE OF SPILL: SHUT OFF AND ELIMINATE ALL IGNITION SOURCES. CONTAIN AND COLLECT MATERIAL. ABSORB RESIDUE.
Protect Eye: Y
Protect Skin: Y
Label Name: INLAND TECHNOLOGY
Label Street: 2612 PACIFIC HIGHWAY EAST
Label City: TACOMA
Label State: WA
Label Zip Code: 98424
Label Country: US
Label Emergency Number: 800-552-3100 / TRANS 800-255-3924
Year Procured: 1994

141, Vehicle Wash

Kleen All Plus

"ALL YOUR CLEANING SUPPLIES UNDER ONE ROOF"

Contact Us

Kleen All Plus Material Safety Data Sheet

IDENTITY: #141, Truck, Bus, and Aircraft Wash

PRODUCT DESCRIPTION AND PURPOSE : A concentrated blend of mild alkaline detergents and synthetic wetting agents to effectively clean vehicle surfaces. Requires minimum agitation of the surface and is free rinsing. Can be used manually or mechanically. Use on houses, motor homes, trucks, trailers, helicopters, planes, military vehicles, etc.

SECTION I

Manufacturer Name:	Kleen All Plus
Address	476 68th Street Brooklyn, NY 11220
Emergency Telephone Number	1-800-537-9545
Telephone Number For Information	1-800-537-9545
Date Prepared:	August 2005
Prepared by:	Staff

SECTION II - HAZARDOUS INGREDIENTS *I* IDENTITY INFORMATION

Hazardous Components	OSHA PEL	ACGIH TLV	OTHER LIMITS	PERCENT OPTIONAL
Dipropylene Glycol Methyl Ether CAS# 34590-94-8	100 ppm	100 ppm	NA	
Anhydrous Sodium Hydroxide CAS# 1310-73-2	3mg/m^3	2m/m^3		<3

*Triethancamine is listed on the following states Right To Know; FL, IL, MA. NJ. PA, RI

**Sodium Hydroxide is subject to SARA Section 31.1/312 and listed as an Immediate hazard. It is also listed on the following states Right To Know; NJ and PA

Health Rating	1	Flammability	0
Reactivity	0	Personal Protection	0

SECTION III - PHYSICAL *I* CHEMICAL CHARACTERISTICS

Boiling Point 212 deg. F	Specific Gravity.(H20=1) >1
Vapor Pressure(mm Hg)… NA	Melting Point: NA
Vapor Density (air=1)…>1	Evaporation Rate…: <1
Solubility in water…Complete	(Butyl Acetate=1)

Appearance and Odor: Blue liquid, lemon odor

Kleen All Plus

"ALL YOUR CLEANING SUPPLIES UNDER ONE ROOF"

SECTION IV - FIRE AND EXPLOSION HAZARD #141 Page 2
Flash Point (Method Used): None Flammable limits: Not Applicable LEL: UEL
Extinguishing Media: Foam, dry chemical
Special Fire Fighting Procedures: None.
Unusual Fire and Explosion Hazards: None

SECTION V
Stability: Unstable [ ] Stable [X] Conditions to Avoid: None
Incompatibility (materials to avoid): Strong oxidizers such as hydrogen peroxide. bromine and chromic acid
Hazardous Decomposition or Byproducts: None
Hazardous Polymerization May occur [ ] Will not occur [X] Conditions to Avoid:

SECTION VI . Health Hazard Data
Route(s) of entry Inhalation? No Skin? Moderate Ingestion? Yes
Health Hazards(Acute and Chronic): Eye contact – May irritate and/or cause corneal damage.
Ingestion – may damage throat and/or respiratory tract.

Carcinogenicity; NTP? No (ARC Monographs)? No OSHA Regulated? No

Medical Conditions Generally Aggravated by Exposure: None recognized

Emergency and First Aid Procedures:. Flush eyes and skin with water. If Irritation of eyes, persists, see physician. Ingestion – get immediate medical attention. Do NOT induce vomiting.

SECTION VII . Precautions for Safe Handling and Use
Steps to Be Taken In Case Material is Released or Spilled: Flush spill with water. Pick up with inert material.

Waste Disposal Method: According to federal, state and local authorities only

Precautions For Storing and Handling: Keep from freezing.

Other Precautions: None

SECTION VIII - Control Measures
Respiratory Protection (Specify Type): Should not be required
Ventilation Local Exhaust: Special:
Mechanical: Other:
Protective Gloves: Impermeable
Eye Protection: Goggles if splashing may occur
Other Protective Clothing or Equipment: Eye wash should be accessible
Work Hygienic Practices: Wash thoroughly after handling

MATERIAL SAFETY DATA SHEET

QUICK REFERENCE **AGRI-SOL™**

MOMAR, INCORPORATED
1830 ELLSWORTH INDUSTRIAL DRIVE
ATLANTA, GEORGIA 30318

HEALTH	1
FLAMMABILITY	1
REACTIVITY	0
PERSONAL PROTECTION	B

EMERGENCY TELEPHONE NO.: INFOTRAC 1-800-535-5053
OTHER INFORMATION CALLS: 404-355-4560

DATE PREPARED: July 14, 2003
DATE REVISED: May 15, 2006

SIGNATURE OF PERSON RESPONSIBLE FOR PREPARATION Edul Hatchett

SECTION 1 – IDENTITY

PRODUCT NAME: AGRI-SOL™
CHEMICAL NAME: Not applicable
CHEMICAL FAMILY: Methyl Ester Soybean Oil/Surfactant blend
FORMULA: Deodorizing, degreasing cleaning concentrate

SECTION 2 – HAZARDOUS INGREDIENTS

PRINCIPAL HAZARDOUS COMPONENT(S)	CAS NO.	%BY WT.	THRESHOLD LIMIT VALUE
1) Methyl Ester Soybean Oil	67784-80-9	>90	Not established

This product does not contain a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40CFR372).

SECTION 3 – PHYSICAL & CHEMICAL CHARACTERISTICS (FIRE & EXPLOSION) DATA

BOILING POINT: 300°F - 320°F
SPECIFIC GRAVITY (H_2O=1)= 0.885
VAPOR PRESSURE (mm Hg): 1.6
PERCENT VOLATILE BY VOLUME (%): Nil
VAPOR DENSITY (Air = 1): Not established
EVAPORATION RATE (BUAC=1): Slower
SOLUBILITY IN WATER: Emulsifiable
REACTIVITY IN WATER: None
APPEARANCE AND ODOR: Amber liquid with slight sweet odor.
pH CONCENTRATE: Not applicable
FLASH POINT: >250°F
FLAMMABLE LIMITS IN AIR % BY VOLUME: Lower: Not established Upper: Not established
EXTINGUISHER MEDIA: CO_2, foam, dry chemical, water spray.
AUTO-IGNITION TEMPERATURE: Not established
SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus. Handle as oil fire. Use water spray to cool fire exposed surfaces to prevent pressure build up.
UNUSUAL FIRE & EXPLOSION HAZARDS: Spills may be slippery. Closed containers may rupture due to build up of pressure when exposed to extreme heat.

PRODUCT NAME: **AGRI-SOL™**

SECTION 4 – PHYSICAL HAZARDS

STABILITY UNSTABLE ☐
STABLE ☒

CONDITIONS TO AVOID: Excessive heat, spark, or open flame.
INCOMPATIBILITY (materials to avoid): Strong oxidizing agents, acids.
HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO_2, irritating smoke.
HAZARDOUS POLYMERIZATION MAY OCCUR ☐ WILL NOT OCCUR ☒

SECTION 5 – HEALTH HAZARDS

THRESHOLD LIMIT VALUE: Not established
PRIMARY ROUTE OF ENTRY: EYE ☒ DERMAL ☒ INHALATION ☒ INGESTION ☒
SIGNS AND SYMPTOMS OF EXPOSURE
1. Acute Overexposure: Harmful if swallowed. Ingestion may cause vomiting, headache, and other medical problems. May be irritating to eyes. Skin contact may cause slight redness. Contains a potential skin sensitizer. Eye contact can cause moderate to high irritation. Inhalation can cause nose, throat, and respiratory tract irritation, coughing and headache.
2. Chronic Overexposure: Prolonged or repeated exposure can cause drying, defatting, and dermatitis of skin.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis
CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN
1. National Toxicology Program: Yes ☐ No ☒
2. I.A.R.C. Monographs: Yes ☐ No ☒
3. OSHA: Yes ☐ No ☒
OSHA PERMISSIBLE EXPOSURE LIMIT: Not established
ACGIH THRESHOLD LIMIT VALUE: Not established
OTHER EXPOSURE LIMIT USED: None

EMERGENCY AND FIRST AID PROCEDURES
1. INHALATION: Remove to fresh air. If breathing is difficult, get medical attention.
2. EYES: Flush with water for 15 minutes. If irritation persists, get medical attention.
3. SKIN: Wash with soap and water. If irritation persists, get medical attention.
4. INGESTION: Do not induce vomiting. Rinse mouth and drink one glass of water. Consult a physician.

SECTION 6 – SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Not normally required.

VENTILATION
LOCAL EXHAUST: Adequate MECHANICAL (GENERAL): Recommended if necessary.
SPECIAL: None OTHER: None
PROTECTIVE GLOVES: Chemically resistant gloves EYE PROTECTION: Safety goggles
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Not usually needed.

PRODUCT NAME: **AGRI-SOL™**

SECTION 7 – SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Do not store in or near heat sources. Product may build slight pressure in storage. Open container slowly. Keep container closed when not in use.

OTHER PRECAUTIONS: KEEP OUT OF REACH OF CHILDREN! Do not cut or weld empty container.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Soak up on absorbent material.

WASTE DISPOSAL METHODS: Incinerate or dispose of in accordance with local, state, and federal regulations.

MATERIAL SAFETY DATA SHEET

QUICK REFERENCE **VEGA-SOL™**

MOMAR, INCORPORATED
1830 ELLSWORTH INDUSTRIAL DRIVE
ATLANTA, GEORGIA 30318

EMERGENCY TELEPHONE NO.: INFOTRAC 1-800-535-5053
OTHER INFORMATION CALLS: 404-355-4580

HEALTH	1
FLAMMABILITY	2
REACTIVITY	0
PERSONAL PROTECTION	B

DATE PREPARED: June 27, 2003
DATE REVISED: May 15, 2006

SIGNATURE OF PERSON RESPONSIBLE FOR PREPARATION Edval Hatchett

SECTION 1 – IDENTITY

PRODUCT NAME: VEGA-SOL™
CHEMICAL NAME: Not applicable
CHEMICAL FAMILY: Vegetable solvent/Surfactant blend
FORMULA: Deodorizing, degreasing cleaning concentrate

SECTION 2 – HAZARDOUS INGREDIENTS

PRINCIPAL HAZARDOUS COMPONENT(S)	CAS NO.	%BY WT.	THRESHOLD LIMIT VALUE
1) Ethyl lactate	97-64-3	>45	Not established
2) Methyl ester soybean oil	67784-80-9	>45	Not established

This product does not contain a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40CFR372).

SECTION 3 – PHYSICAL & CHEMICAL CHARACTERISTICS (FIRE & EXPLOSION) DATA

BOILING POINT: 340°F - 372°F SPECIFIC GRAVITY (H_2O=1)= 0.950
VAPOR PRESSURE (mm Hg): Not established
PERCENT VOLATILE BY VOLUME (%): >40
VAPOR DENSITY (Air = 1): Not established
EVAPORATION RATE (BUAC=1): Slower
SOLUBILITY IN WATER: Emulsifiable REACTIVITY IN WATER: None
APPEARANCE AND ODOR: Yellow liquid with slight detergent odor.
pH 1% SOLUTION: 6.5 – 8.5
FLASH POINT: 145°F
FLAMMABLE LIMITS IN AIR % BY VOLUME: Lower: Not established Upper: Not established
EXTINGUISHER MEDIA: CO_2, foam, dry chemical, water spray.
AUTO-IGNITION TEMPERATURE: Not established
SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus. Handle as oil fire. Use water spray to cool fire exposed surfaces to prevent pressure build up.
UNUSUAL FIRE & EXPLOSION HAZARDS: Spills may be slippery. Closed containers may rupture due to build up of pressure when exposed to extreme heat.

PRODUCT NAME: **VEGA-SOL™**

SECTION 4 – PHYSICAL HAZARDS

STABILITY UNSTABLE ☐
STABLE ☒
CONDITIONS TO AVOID: Excessive heat, spark, or open flame.
INCOMPATIBILITY (materials to avoid): Strong oxidizing agents, acids.
HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO_2, irritating smoke.
HAZARDOUS POLYMERIZATION MAY OCCUR ☐ WILL NOT OCCUR ☒

SECTION 5 – HEALTH HAZARDS

THRESHOLD LIMIT VALUE: Not established
PRIMARY ROUTE OF ENTRY: EYE ☒ DERMAL ☒ INHALATION ☒ INGESTION ☒
SIGNS AND SYMPTOMS OF EXPOSURE
1. Acute Overexposure: Harmful if swallowed. Ingestion may cause vomiting, headache, and other medical problems. May be irritating to eyes. Skin contact may cause slight redness. Contains a potential skin sensitizer. Eye contact can cause moderate to high irritation. Inhalation can cause nose, throat, and respiratory tract irritation, coughing and headache.
2. Chronic Overexposure: Prolonged or repeated exposure can cause drying, defatting, and dermatitis of skin.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis
CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN
1. National Toxicology Program: Yes ☐ No ☒
2. I.A.R.C. Monographs: Yes ☐ No ☒
3. OSHA: Yes ☐ No ☒
OSHA PERMISSIBLE EXPOSURE LIMIT: Not established
ACGIH THRESHOLD LIMIT VALUE: Not established
OTHER EXPOSURE LIMIT USED: None

EMERGENCY AND FIRST AID PROCEDURES
1. INHALATION: Remove to fresh air. If breathing is difficult, get medical attention.
2. EYES: Flush with water for 15 minutes. If irritation persists, get medical attention.
3. SKIN: Wash with soap and water. If irritation persists, get medical attention.
4. INGESTION: Do not induce vomiting. Rinse mouth and drink one glass of water. Consult a physician.

SECTION 6 – SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Not normally required.

VENTILATION
LOCAL EXHAUST: Adequate MECHANICAL (GENERAL): Recommended if necessary.
SPECIAL: None OTHER: None
PROTECTIVE GLOVES: Chemically resistant gloves EYE PROTECTION: Safety goggles
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Not usually needed.

PRODUCT NAME: **VEGA-SOL™**

SECTION 7 – SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Do not store in or near heat sources. Product may build slight pressure in storage. Open container slowly. Keep container closed when not in use.

OTHER PRECAUTIONS: KEEP OUT OF REACH OF CHILDREN! Do not cut or weld empty container.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Soak up on absorbent material.

WASTE DISPOSAL METHODS: Incinerate or dispose of in accordance with local, state, and federal regulations.

MATERIAL SAFETY DATA SHEET

OSTREM CHEMICAL CO. LTD.
2310 - 80 AVENUE
EDMONTON AB T6P 1N2

Phone: (780) 440-1911
In Case of Emergency Only:
Phone CANUTEC: (613) 996-6666

Date completed: Nov. 1, 2005

PRODUCT NAME: **T-300 TAR REMOVER** **CODE: I311**
OTHER NAME:
DISTRIBUTED BY:

WHMIS CLASSIFICATION: B3; D2B
TDG CLASSIFICATION: Not Regulated

HAZARDOUS INGREDIENTS	%WT/WT	CAS NO.	TOXICITY DATA (LD_{50} & LC_{50})
Petroleum Distillates	60-100	8008-20-6	LD_{50} Oral (rabbit) 5000 mg/kg ACGIH TLV - 5 mg/m^3
Ethylene Glycol Monobutyl-Ether	3-7	111-76-2	LD_{50} Oral (rat) 1480 mg/kg LD_{50} Dermal (rabbit) 630 mg/k

PHYSICAL DATA FOR PRODUCT

Physical State: Liquid
Boiling Point: 160°C
Vapour Density: Not Avail.
Freezing Point: -39°C
Sp. Gravity: 0.8267
Vapour Pressure: Not Avail.
Evaporation Rate: Not Avail.
pH: neutral
Solubility in Water: Makes water emulsion.
Appearance & Odour: Clear liquid, with solvent smell.

FIRE AND EXPLOSION DATA FOR PRODUCT

Flash Point (Test Method): Tag closed cup 46°C
Flammable Limits in Air, % by vol. Lower: Not Avail. Upper: Not Avail.
Fire Extinguishing Substances: (X) Water Fog ( ) Foam (X) CO_2 (X) Dry Chem ( ) Other:

Hazardous Combustion Products: Fumes, smoke, carbon monoxide and sulphur oxides in case of incomplete combustion.

Special Firefighting Procedures: Treat as petroleum solvent.

REACTIVITY DATA FOR PRODUCT

Incompatibility: ( ) Water (X) Oxidizing Material ( ) Acid ( ) Base ( ) Other:
Hazardous Decomposition Products: Flammable toxic gases will form at elevated temperatures.

Chemical Stability: Stable.

*N/A - Not applicable.

Product Name: **T-300 TAR REMOVER**

HEALTH HAZARD INFORMATION FOR PRODUCT

EMERGENCY and FIRST AID PROCEDURES

Inhalation: Move to fresh air. Get medical attention if respiratory irritation occurs.

Ingestion: Drink large quantities of water. Get medical attention. Do not induce vomiting.

Eyes: Rinse with plenty of water for 15 minutes. If irritation persists, get medical attention.

Skin: Rinse with water.

EFFECTS OF OVEREXPOSURE (Acute and Chronic)

Inhalation: High concentrations may cause headache, drowsiness, irritation of respiratory tract.

Ingestion: Causes G.I. irritation with vomiting and diarrhea. Aspiration of vomit causes serious pneumonitis. Glycol ether has a toxic effect on the red blood cells.

Eyes: Causes irritation. Avoid contact with eyes.

Skin: Avoid prolonged contact with skin. De-fatting action on skin can lead to irritation and infection.

PREVENTIVE MEASURES

Steps to be taken upon release or spillage (including neutralizing):

Treat as petroleum solvent. Prevent spills from entering sewers, watercourses or low areas. Contain spillage with sand or earth. Avoid using combustible material such as sawdust.

Waste disposal method:

Treat as petroleum solvent. Consult an expert on disposal of recovered material. Insure compliance with government and local regulations.

Handling and Storage Requirements:

Keep container closed. Store in cool, well ventilated area away from incompatibles. Material will accumulate static charges, which may cause a spark. Use proper grounding procedure.

Ventilation Requirements (Local or General):

Use in ventilated area. Local exhaust ventilation is recommended.

Respiratory Protection:

Where exposure limits may be exceeded, approved respirator may be necessary to prevent overexposure by inhalation.

Eye Protection:

Chemical Workers goggles.

Other Protection:

Impervious rubber gloves, overalls and apron should be worn.

Prepared by: Technical Services Department, Ostrem Chemical Co. Ltd., Ph: (780) 440-1911

MATERIAL SAFETY DATA SHEET

PETROFERM INC.
2416 Lynndale Road
Fernandina Beach, Florida 32034
(904) 261-8286
www.petroferm.com

CHEMTREC 24-HOUR EMERGENCY RESPONSE
TOLL FREE NUMBER: (800) 424-9300
INTERNATIONAL CALLS: COLLECT (703) 527-3887
CHEMTREC should only be contacted in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals.

1. PRODUCT NAME

AXAREL®* 32

2. COMPOSITION AND INFORMATION ON INGREDIENTS

	CAS Number	Weight %	OSHA PEL	ACGIH TLV
Mixed aliphatic hydrocarbons	64742-47-8	70 - 90	500 ppm	Not est.
Diisobutyl dibasic acid ester mixture		15-20		
diisobutyl glutarate	71195-64-7		Not est.	Not est.
diisobutyl adipate	141-04-8		Not est.	Not est.
diisobutyl succinate	925-06-4		Not est.	Not est.
Alkyloxy polyethylene oxyethanol	84133-50-6	4.5-9.5	Not est.	Not est.

3. HAZARDS IDENTIFICATION

SYMPTOMS/EFFECTS OF OVEREXPOSURE

Inhalation: May cause irritation of the upper respiratory passages.

Ingestion: May cause irritation of the mouth, throat, and gastrointestinal tract with nonspecific discomfort such as nausea, headache, diarrhea, thirst, and weakness.

Skin: May cause skin irritation or rash. Repeated contact may cause progressive dermatitis.

Eyes: Liquid or vapor contact may cause eye irritation with tearing or blurring of vision.

Listed Carcinogens: None

4. FIRST AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

Ingestion: Do not induce vomiting. Immediately give two glasses of water; seek medical attention.

Skin: Remove contaminated clothing. Thoroughly wash affected area with soap and water; use skin cream if irritation is severe.

Eyes: Immediately flush eyes with water for 15 minutes. Call a physician if irritation persists.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Chemical foam, dry chemical, carbon dioxide. Class BC, ABC fire extinguisher.

Special Fire Fighting Procedures: Self-contained positive pressure breathing apparatus and protective clothing should be worn in fighting fires involving chemicals.

Unusual Fire and Explosions Hazards: None known

6. ACCIDENTAL RELEASE MEASURES

Absorb spill with inert material, then place in chemical waste container. For large spills, dike for later disposal. Observe government regulations.

* Registered trademark of Petroferm Inc.

7. HANDLING AND STORAGE

Store in original container, preferably in a cool, ventilated, fire-resistant building. Avoid overheating or freezing. Since empty containers may retain product residues (vapor, liquid, or solid) all label precautions must be observed.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

Respiratory: Use NIOSH/MSHA approved respirator if ventilation is not sufficient and if mists are generated.

Ventilation: If desirable to reduce odor, mechanical (general) ventilation should have an airflow of 55 CFM or greater. Local exhaust can also be effective in minimizing odor.

Clothing/Glove: Chemically resistant gloves should be used with all industrial chemicals.

Eye Protection: Safety glasses/goggles are recommended. Provide eye bath near work site.

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (760 mm Hg): 430°-563°F (221°-295°C)

% Volatile (By Weight): Not determined.

Specific Gravity (H_2O = 1): 0.85 @ 77°F (25°C)

Vapor Pressure (20°C): < 0.1 mm Hg

Flash Point: 205°F (96°C) (ASTM D93-85, Pensky-Martens Closed Cup)

Vapor Density (Air = 1): 6.7

Evaporation Rate (BUAC = 1): < 0.1

Solubility in Water: < 0.1% by weight

Appearance and Odor: Colorless to light yellow liquid with a mild hydrocarbon odor.

Flammable Limits (% By Volume in Air): Not determined

10. STABILITY AND REACTIVITY

Stability: AXAREL 32 is stable.

Conditions to Avoid: Temperatures above 430°F (221°C). Keep away from heat, sparks, and open flames.

Incompatibility: Strong oxidizing agents, strong acids, strong bases.

Hazardous Decomposition Products: None, other than normal products of combustion.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diisobutyl dibasic acid esters

LD50/oral/rat = 16,426 mg/kg

LC50/inhalation/4 hrs/rat = > 31.9 mg/L

12. ECOLOGICAL INFORMATION

Alkyloxy polyethylene oxyethanol

96 hour LC50 in fathead minnows: 3.1 - 3.8 mg/L

48 hour LC50 in daphnia magna: 1.5 - 1.7 mg/L

Diisobutyl dibasic acid esters

96 hour LC50 in fathead minnows: 18 - 24 mg/L

48 hour LC50 in daphnia magna: 112 – 150 mg/L

13. DISPOSAL CONSIDERATIONS

Waste treat or incinerate used material in compliance with all applicable government regulations.

14. TRANSPORT INFORMATION

Non-Regulated.

15. REGULATORY INFORMATION

None of the components of AXAREL 32 is listed in the Threshold Limit Values and Biological Exposure Indices compiled by the American Conference of Governmental Industrial Hygienists.

None of the components of this product appears on any of the EPA's lists of toxic or hazardous substances, or on the SARA 313 toxic chemicals list (40 CFR 372.65).

This product contains a secondary alcohol ethoxylate which contains traces of dioxane, ethylene oxide, formaldehyde, and acetaldehyde which are listed in California's Safe Drinking Water and Toxic Enforcement Act of 1986 – Proposition 65 as chemicals known to cause cancer, birth defects, or other reproductive harm.

All components of this product are listed on the TSCA inventory.

Canadian WHMIS Classification: This is not a controlled product.

None of the components of this product are specifically regulated or proposed for regulation under the Federal Clean Water Act including the EPA list of 129 priority water pollutants or the EPA list of total toxic organic (TT0) (40 CFR 413.02).

16. OTHER INFORMATION

NFPA-HMIS Codes: Health: 1 Fire: 1 Reactivity: 0

MATERIAL SAFETY DATA SHEET

This MSDS complies with OSHA's Hazard Communication Standard 29 CFR 1910, 1200 and OSHA Form 174

IDENTITY AND DISTRIBUTOR'S INFORMATION

NFPA Rating: Health-1; Flammability-1; Reactivity-0; Special-	**HMIS Rating:** Health-1; Flammability-1; Reactivity-0; Personal Protection-B
Manufactured For: Schaeffer Mfg. Company Address: 102 Barton Street Address St. Louis, MO 63104	**DOT Hazard Classification:** ORM-D **Identity** (trade name as used on label): **#739 Citrol II (Spray)**
Phone: 800-325-9962	**MSDS Number**: 364 Revision-4
Emergency Response Number: 314-865-4105 NOTICE: JUDGMENT BASED ON INDIRECT TEST DATA	Date Prepared: 03/22/93 Prepared By: ES Information Calls: (770)422-2071

SECTION 1 - MATERIAL IDENTIFICATION AND INFORMATION

COMPONENTS-CHEMICAL NAMES AND COMMON NAMES (Hazardous Components 1% or greater; Carcinogens 0.1% or greater)	CAS Number	SARA III List	OSHA PEL (ppm)	ACGIH TVL (ppm)	Carcinogen Ref. Source**
Monocyclic Terpene	5989-27-5	No	N/E	N/E	D

Section 2 - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: N/A	Specific Gravity (H2O=1): Concentrate Only = .84
Vapor Pressure: PSIG @ 70°F (Aerosols): Max: 50	Vapor Pressure (Non-Aerosols)(mm Hg and Temperature): N/A
Vapor Density (Air = 1): 8	Evaporation Rate: (=1): N/E
Solubility in Water: Negligible	Water Reactive: No
Appearance and Odor: Thin clear liquid with citrus fragrance.	

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY as per USA FLAME PROJECTION TEST (aerosols) Non-Flammable	Auto Ignition Temperature N/E	Flammability Limits in Air by % in Volume: %LEL: N/E %UEL: N/E
FLASH POINT AND METHOD USED (Non-aerosols): N/A SPECIAL FIRE FIGHTING PROCEDURES: Use water fog to cool containers to prevent rupturing and bursting.	EXTINGUISHER MEDIA: Foam, dry chemical, carbon dioxide.	
Unusual Fire & Explosion Hazards: Do not expose aerosols to temperatures above 130°F or the container may rupture. Provide Shielding to protect personnel.		

SECTION 4 - REACTIVITY HAZARD DATA

STABILITY [X] STABLE [ ] UNSTABLE	HAZARDOUS POLYMERIZATION[ ] WILL [X] WILL NOT OCCUR
Incompatibility (Mat. to avoid): Oxidants.	Conditions to Avoid: Open flame, welding arcs, heat, sparks
Hazardous Decomposition Products: Carbon dioxide	

SECTION 5 - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY: [...] INHALATION [ ] INGESTION [ ] SKIN ABSORPTION [X] EYE [ ] NOT HAZARDOUS	
ACUTE EFFECTS;	
Inhalation: Can cause headaches, dizziness.	
Eye Contact: Irritation.	Skin Contact: Can cause skin defatting
Ingestion: Possible chemical pneumonitis if aspirated into lungs	
CHRONIC EFFECTS: None known.	
Medical Conditions Generally Aggravated by Exposure: Asthma	

EMERGENCY FIRST AID PROCEDURES

Eye Contact:	Flush with water for 15 minutes, if irritated, seek medical attention.
Skin Contact	Wash with soap and water. if irritated, seek medical attention.
Inhalation:	Remove to fresh air. Resuscitate if necessary. Get medical attention.
Ingestion:	DO NOT INDUCE VOMITING. Drink two large glasses of water. Get immediate medical attention.

SECTION 6 - CONTROL AND PROTECTIVE MEASURES

Respiratory Protection (specify type): Not normally needed.	
Protective Gloves: Solvent resistant	Eye Protection: Safety glasses recommended.
Ventilation Requirements: Normal room ventiltation	
Other Protective Clothing & Equipment: None.	
Hygienic Work Practices: Wash with soap and water after contact.	

SECTION 7 - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps To Be Taken if Material Is Spilled Or Released: Cover with absorbent material and sweep up. Wash area to prevent slipping. Incinerate or landfill according to local, state or federal regulations.
Waste Disposal Methods: Aerosol cans when vented to atmospheric pressure through normal use pose no disposal hazard.
Precautions To Be Taken In Handling & Storage: Do not puncture or incinerate containers. Do not store at temperatures above 130°F.
Other Precautions &/or Special Hazards: KEEP OUT OF REACH OF CHILDREN..

We believe the statements, technical information and recommendations contained herin are reliable, but they are given without warranty or guarantee of any kind.

**Chemical Listed as Carcinogen or Potential Carcinogen, [a] NTP[b]ARC Monograph [c]OSHA [d]not listed [e]Animal Data Only

Rev. 4/30/07
Replaces 9/25/03

F084 TAR N GLUE
Revision Date: 17/05/2006

SAFETY DATA SHEET

F084 TAR N GLUE

1. IDENTIFICATION OF THE PREPARATION AND COMPANY

PRODUCT CODE: F084
PRODUCT NAME: TAR N GLUE

MANUFACTURER: Selden Research Limited
Staden Lane
Ashbourne Road
Buxton
Derbyshire
SK17 9RZ

TELEPHONE: 01298 26226
FAX: 01298 26540
EMAIL: safety@selden.co.uk

2. COMPOSITION/INFORMATION ON INGREDIENTS

NAME CAS No.:	EINECS Nr.:	CLASSIFICATION	CONTENT
1,2,4-TRIMETHYLBENZENE 95-63-6	202-436-9	R10 Xn;R20 Xi;R36/37/38 N;R51/53	30-60 %
ALCOHOL ETHOXYLATE		Xi;R38,R41.	1-5 %
ANIONIC DETERGENT 68584-24-7	271-531-5	Xi;R36.	1-5 %
Solvent, Light aromatic, Naptha (Petroleum)		Xn;R65. N;R51/53. R66,R67.	30-60 %
XYLENE-ortho 95-47-6	202-422-2	R10 Xn;R20/21 Xi;R38	1-5 %

The full text for all R-Phrases are displayed in Section 16

3. HAZARDS IDENTIFICATION

R10 Flammable., R20 Harmful by inhalation., R65 Harmful: may cause lung damage if swallowed., R36/37/38 Irritating to eyes, respiratory system and skin., R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

4. FIRST AID MEASURES

INHALATION: Move the exposed person to fresh air at once. Keep the affected person warm and at rest. Get prompt medical attention. For breathing difficulties oxygen may be necessary.

INGESTION: Remove victim immediately from source of exposure. Rinse mouth thoroughly. DO NOT induce vomiting. Get medical attention immediately. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

SKIN: Remove affected person from source of contamination. Wash the skin immediately with soap and water. Get medical attention if any discomfort continues.

EYES: Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Use:, Dry chemicals, sand, dolomite etc. Water spray, fog or mist. Carbon dioxide (CO2).

SPECIAL FIRE FIGHTING PROCEDURES: Move container from fire area if it can be done without risk. Use water to keep fire exposed containers cool and disperse vapours.

6. ACCIDENTAL RELEASE MEASURES

SPILL CLEAN UP METHODS: Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Ventilate. Stop leak if possible without risk. Ventilate well. Wear necessary protective equipment. Absorb in vermiculite, dry sand or earth and place into containers.

7. HANDLING AND STORAGE

USAGE PRECAUTIONS: Keep away from heat, sparks and open flame. Avoid spilling, skin and eye contact. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level. Static electricity and formation of sparks must be prevented.

STORAGE PRECAUTIONS: Flammable/combustible - Keep away from oxidisers, heat and flames. Keep containers tightly closed.

USAGE DESCRIPTION: Flammable liquid storage.

F084 TAR N GLUE
Revision Date: 17/05/2006

SAFETY DATA SHEET

F084 TAR N GLUE

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

PROTECTIVE EQUIPMENT:


9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, Liquid
COLOUR:	Light (or pale), Amber
ODOUR:	Solvent.
DENSITY/SPECIFIC GRAVITY(g/ml)	0.871 - 0.881
pH-VALUE, CONC. SOLUTION:	N/A
SOLUBILITY:	Immiscible with water
FLASH POINT (°C):	47 CC (Closed

10. STABILITY AND REACTIVITY

STABILITY:	Stable under normal temperature conditions.
CONDITIONS TO AVOID:	Avoid heat, flames and other sources of ignition.
HAZARDOUS COMPOSITION PRODUCTS:	Fire creates:, Toxic gases/vapours/fumes of:, Carbon monoxide (CO). Carbon dioxide (CO2).

11. TOXICOLOGY INFORMATION

INHALATION:	Vapour from this chemical can be hazardous when inhaled.
INGESTION:	Harmful: may cause lung damage if swallowed.
SKIN CONTACT:	Prolonged or repeated exposure may cause severe irritation. Acts as a defatting agent on skin. May cause cracking of skin, and eczema.
EYE CONTACT:	Repeated exposure may cause chronic eye irritation.

12. ECOLOGICAL INFORMATION

ECOTOXICITY:	Toxic to aquatic organisms., May cause long term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

DISPOSABLE METHODS:	Dispose of waste and residues in accordance with local authority requirements.

14. TRANSPORT INFORMATION

UN No ROAD:	1268

F084 TAR N GLUE
Revision Date: 17/05/2006

SAFETY DATA SHEET

F084 TAR N GLUE

15. REGULATORY INFORMATION

LABEL FOR SUPPLY:

RISK PHRASES:	R10 Flammable. R20 Harmful by inhalation. R36/37/38 Irritating to eyes, respiratory system and skin. R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 Harmful: may cause lung damage if swallowed.
SAFETY PHRASES:	S2 Keep out of the reach of children, S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37/39 Wear suitable gloves and eye/face protection. S46 If swallowed, seek medical advice immediately and show this container or label. S51 Use only in well-ventilated areas.
STATUTORY INSTRUMENTS:	Chemicals (Hazard Information and Packaging) Regulations.
APPROVED CODE OF PRACTICE:	Safety Data Sheets for Substances and Preparations. Classification and Labelling of Substances and Preparations Dangerous for Supply.
GUIDANCE NOTES:	Workplace Exposure Limits EH40. CHIP for everyone HSG(108).

16. OTHER INFORMATION

USER NOTES:	The following risk phrases relate to the raw materials in the product and not the product itself:-
REVISION DATE:	17/05/2006
REV. NO./REPL. SDS GENERATED:	9
R-PHRASES (Full Text):	R10 Flammable., R38 Irritating to skin., R20/21 Harmful by inhalation and in contact with skin.| R10 Flammable., R20 Harmful by inhalation., R36/37/38 Irritating to eyes, respiratory system and skin., R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.| R36 Irritating to eyes.| R38 Irritating to skin., R41 Risk of serious damage to eyes.| R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment., R66 Repeated exposure may cause skin dryness or cracking., R67 Vapours may cause drowsiness and dizziness., R65 Harmful: may cause lung damage if swal|

MATERIAL SAFETY DATA SHEET

Sentinel Products Inc. – 51 Northeast 77th Avenue, Mpls. MN 55432 - (763)571-0630 - FAX(763)571-1819

SECTION 1 PRODUCT IDENTIFICATION & EMERGENCY INFORMATION

PRODUCT NAME: SENTINEL® 700™ DEGREASER
SYNONYMS: EMULSIFIED ORGANIC HYDROCARBON
EMERGENCY MEDICAL AND SPILL NUMBER: 1-866-359-5661

SECTION 2 COMPONENT & EXPOSURE DATA

COMPONENT	CAS#	PEL	TLV
REFINED PETROLEUM SOLVENTS	64742-47-8	100 PPM,525 mg/m3 for 8 hour TWA	
ETHYLENE GLYCOL MONOBUTYL ETHER *	111-76-2	25 PPM (SKIN)	25 PPM (SKIN)

(Common name for ethylene glycol monobutyl ether is: 2-butoxy ethanol.)

**CONTAINS 2-6% BY WEIGHT. SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372.*

SECTION 3 EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: If this product comes in contact with eyes, gently flush with large quantities of water for at least 15 minutes. If irritation persists, seek immediate medical attention.
SKIN CONTACT: Remove contaminated clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops and persists, seek medical attention.
INHALATION: If breathing difficulties, dizziness, or light-headedness occur when working in areas with high vapor concentration, victim should seek air free of vapors. If breathing stops, begin artificial respiration and seek immediate medical attention.
INGESTION (SWALLOWING): If this product is swallowed, DO NOT induce vomiting unless directed by a physician. Seek immediate medical advice and/or attention.

SECTION 4 HEALTH HAZARDS & ROUTES OF ENTRY

EYE CONTACT: This product may cause irritation. Direct contact with the liquid or exposure to its vapors or mists may cause burning, tearing or redness.
SKIN CONTACT: This product may cause skin irritation. Prolonged or repeated exposure to this material may cause redness, burning, drying or cracking of the skin or dermatitis. Persons with pre-existing skin disorders may be more susceptible to the effects of this material.
INHALATION: Inhalation of excessive concentration of vapors or mists may cause irritation of the nose and throat and signs of nervous system depression (e.g. drowsiness, dizziness, loss of coordination and fatigue). Persons with impaired lung function or asthma-like conditions may experience additional breathing difficulties due to the irritant properties of the material.
INGESTION (SWALLOWING): Ingestion of excessive quantities may cause irritation of the digestive tract and signs of nervous system depression (e.g. drowsiness, dizziness, loss of coordination and fatigue). Acute exposure to these compounds results in narcosis, pulmonary edema, and severe kidney and liver damage.
ASPIRATION HAZARD: This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.
COMMENTS: THIS SUBSTANCE HAS NOT BEEN IDENTIFIED AS A CARCINOGEN OR PROBABLE CARCINOGEN BY NTP, IARC, OR OSHA.

SECTION 5 SPECIAL PROTECTION INFORMATION

VENTILATION: If current ventilation practices are not adequate for minimizing exposures, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, systems safe for such locations should be used.
RESPIRATORY INFORMATION: Respiratory protection may be necessary to minimize exposure to organic vapors or gases. Depending on the nature and concentration of the airborne material, use a respirator or gas mask with appropriate cartridges and canisters, (NIOSH approved) or supplied air equipment.
PROTECTIVE GLOVES: The use of gloves impermeable to this material is advised to prevent skin contact and possible irritation. Wear resistant gloves, such as nitrile or neoprene.
EYE PROTECTION: Approved eye protection is recommended to safeguard against eye contact, irritation or injury.
OTHER PROTECTIVE EQUIPMENT: It suggested that a source of clean water be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

SECTION 6 REACTIVITY DATA

STABILITY: Stable HAZARDOUS POLYMERIZATION: Will not occur
INCOMPATIBILITY (MATERIALS TO AVOID): This product is incompatible with strong oxidizing agents.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition in the presence of air may yield carbon monoxide and/or carbon dioxide.

SECTION 7 SPILL OR LEAK PROCEDURES

PRECAUTION IN CASE OF LEAK OR SPILL: Stay upwind and away from spill. Keep all sources of ignition and hot metal surfaces away from spill. If spill is indoors, ventilate area of spill. Foam, especially high expansion foam, may be used to suppress vapors. Keep contained and dispose of in accordance with local, county, state, and federal regulations.

SECTION 8 STORAGE, SHIPPING, & REGULATORY INFORMATION

HANDLING & STORAGE: Keep containers tightly closed. Keep containers cool, dry, and away from sources of ignition. Use and store this product with adequate ventilation. Avoid inhalation of vapors. DO NOT pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks or other sources if ignition. "Empty" drums should be completely drained, properly bunged and promptly shipped to a qualified drum reconditioner.
DOT PROPER SHIPPING NAME: Combustible liquid, NOS DOT IDENTIFICATION NUMBER: NA 1993
DOT HAZARD CLASS: Combustible liquid PACKING GROUP: III

HAZARD RATINGS	HMIS	NFPA
HEALTH	1	1
FLAMMABILITY	2	2
REACTIVITY	0	0

COMBUSTIBLE LIQUID AS DEFINED BY OSHA HAZARD COMMUNICATION STANDARD.

SECTION 9 FIRE AND EXPLOSION HAZARD

FLASH POINT (TEST METHOD): 146° F. PMCC / 154° F. COC
FLAMMABLE LIMITS IN AIR. % BY VOL. LOWER: 1.2 UPPER: 6.0
EXTINGUISHING MEDIA: Small fires-Extinguish with dry chemical, CO_2 or foam. Large fires-The use of dry chemical or foam is recommended.
FIRE AND EXPLOSION HAZARD: This material is combustible and may be ignited by heat or flame. This material will burn, but will not ignite readily.
FIRE FIGHTING PROCEDURES: The use of a SCBA is recommended for fire fighters. Water spray may be useful in minimizing vapors and cooling containers exposed to heat and flame. Avoid spreading burning liquid with water used for cooling purposes.

SECTION 10 PHYSICAL DATA

BOILING POINT (°F): 370 - 518° F. SPECIFIC GRAVITY (H_2O=1): ~.804
VAPOR PRESSURE: Negligible MELTING POINT: N/A
APPEARANCE & ODOR: Green - Mild/characteristic. VAPOR DENSITY: Heavier than air.

SECTION 11 DOCUMENTARY INFORMATION

DISCLAIMER OF EXPRESSED OR IMPLIED WARRANTIES The information in this document is believed to be correct as of the date issued. However, no warranty of merchantability, fitness for any particular purpose, or any other warranty is expressed or is to be implied regarding the accuracy or completeness of this information, the results to be obtained from the use of this information or the product, the safety of this product or the hazards related to its use. This information and product are furnished on the condition that the person receiving them shall make his/her own determination as to the suitability of the product for his/her particular purpose and on the condition the he/she assume the risk of his use thereof.

Issue Date: September, 2006

SOYSOLV ®

MATERIAL SAFETY DATA SHEET

SECTION 1 MATERIAL IDENTIFICATION

Material/Trade Name: OLEOCAL ME-130
Synonyms: METHYL SOYATE
Chemical Family/Formula: METHYL ESTER OF SOYA OIL

SOYsolv ®
6154 N CR 33
Tiffin OH 44883

800-231-4274
e-mail: sales@soysolv.com
www.soysolv.com

Emergency Phone # 800-231-4274 Revised 3/24/00

SECTION 2 INGREDIENTS

Chemical Name: MIXED FATTY ACID METHYL ESTERS CAS NO: 67784-80-9

62.4%	Linoleic	22.5%	Oleic	8.5%	Palmitic	3.2%	Linolenic
		3.0%	Stearic	0.3%	Palmitoleic	0.1%	Erui

SECTION 3 PHYSICAL DATA

Boiling Point, 760 mm Hg: >420º F
Specific Gravity (H_2O=1): 0.88
Vapor Pressure, mm Hg: <1
Vapor Density, Air=1: >1
Appearance and Odor: yellow liquid, mild fatty odor

Volatiles, % by Volume: <2%
Solubiulity in H_2O, % by Volume: insoluble
Evaporation Rate, Butyl Acetate=1: .0098

SECTION 4 FIRE & EXPLOSION DATA

Flash Point (Method Used): >300º F (COC) LEL: N/A UEL: N/A
Flammability Limits: None known

Extinguishing Media: Dry chemical, foam, halon CO_2, water spray (fog). Water stream may splash burning liquid and spread fire.

Special Fire Fighting Procedures: Use water spray to cool drums exposed to fire.

Unusual Fire and Explosion Hazards: Firefighters should use self-contained breathing apparatus to avoid exposure to smoke and vapors.

SECTION 5 REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur.

Conditions and Materials to Avoid: Strong oxidizing agents.

Hazardous Decomposition Products: combustion produces carbon monoxide, carbon dioxide with thick smoke.

SECTION 6 OCCUPATIONAL EXPOSURE LIMITS

No TLV has been set for this product. As with all industrial materials, exposure of this product to the skin and eyes should be avoided.

SECTION 7 HEALTH INFORMATION

Inhalation hazard is negligible unless heated to produce vapors or as a mist. Vapors or finely misted materials may irritate the mucous membranes and cause irritation, dizziness and nausea. Remove to fresh air.

Eye contact may cause irritation. Irrigate eye with water for at least 15 to 20 minutes. Seek medical attention if symptoms persist.

Prolonged or repeated contact with the skin is not likely to cause significant skin irritation. Material is sometimes encountered at elevated temperatures. Thermal burns are possible.

No hazards anticipated from ingestion incidental to industrial exposure.

SECTION 8 EMERGENCY & FIRST AID PROCEDURES

Eyes: Irrigate eyes with water for at least 15 to 20 minutes.
Skin: Wash exposed areas of the body with soap and water.
Inhalation: Remove from area of exposure; seek medical attention if symptoms persist.
Ingestion: Give one or two glasses of water to drink. If gastro-intestinal symptoms develop, consult medical personnel. (Never give anything by mouth to an unconscious person.)

SECTION 9 EMPLOYEE PROTECTION

Respiratory Protection: If vapors or mists are generated, wear a NIOSH approved organic vapor/mist respirator.

Protective Clothing: Safety glasses, goggles or face shield recommended to protect eyes from mists or splashing. PVC coated gloves recommended to prevent skin contact.

Other Protective Measures: Employees must practice good personal hygiene, washing exposed areas of the skin several times daily and laundering contaminated clothing before re-use.

SECTION 10 ENVIRONMENTAL PROTECTION

Spill Cleanup Procedures: Remove sources of ignition, contain spill to smallest area possible. Stop leak if possible. Pick up small spills with absorbent materials such as paper towels, "Oil Dry", sand or dirt. Recover large spills for salvage or disposal. Wash hard surfaces with safety solvent or detergent to remove remaining oil film. Greasy nature will result in a slippery surface.

Waste Disposal: Waste may be disposed of by a licensed waste disposal company. Contaminated absorbent materials may be disposed of in an approved land fill. Follow local, state and federal disposal regulations.

Environmental Hazards: None

SECTION 11 SPECIAL PRECAUTIONS

Store in closed containers between 50º F – 120º F.

Keep away from oxidizing agents, excessive heat and ignition sources.

Store and use in well ventilated areas.

Do not store or use near heat, sparks, or flame; store out of sun.

Do not puncture, drag, or slide this container.

Drum is not a pressure vessel; never use pressure to empty.

SECTION 12 TRANSPORTATION REQUIREMENTS

DOT Shipping Name: Fatty Acid Ester
DOT I.D. #: 144920
DOT Classification: Class 65
UN Hazard Class: N/A

SECTION 13 OTHER REGULATORY CONTROLS

OSHA STATUS:
This product is not hazardous under the criteria of the Federal OSHA Hazard communication Standard 29 CFR 1910.1200 However, thermal processing and decomposition fumes from this product may be hazardous as noted in Sections 2 and 7.

TSCA STATUS:
This product is listed on TSCA.

CERCLA: (Comprehensive Response compensation, and Liability Act)
NOT reportable.

SARA TITLE III (Superfund Amendments and Reauthorization Act)
Section 312 Extremely Hazardous Substances: None
Section 311/312 Hazard Categories: Non-hazardous Under Section 311/312
Section 313 Toxic chemicals: None

RCRA STATUS:
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

CALIFORNIA PROPOSITION 65
The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986. The product contains no chemicals known to the State of California to cause cancer.

SOYSOLV® II

MATERIAL SAFETY DATA SHEET

SECTION 1 MATERIAL IDENTIFICATION

Product Name: SOYsolv II
Revision Date: 3/24/00
Chemical Name: Mixture of Surfactants and Methyl Soyate

SOYsolv®
6154 N CR 33
Tiffin OH 44883
Emergency Phone #: 800-231-4274
800-231-4274
e-mail: sales@soysolv.com
www.soysolv.com

SECTION 2 INGREDIENTS

Mixed Fatty Acid Methyl Esters CAS NO. 67784-80-9 Emulsifier CAS NO. 9016-45-9

This material is not known to contain any chemical listed as a carcinogen by OSHA, IARC or the National Toxicology Program (NTP) at a concentration greater than 0.1%.

SECTION 3 FIRE AND EXPLOSIVE HAZARDS

Flash Point ºF:	>300 Pensky-Martin closed cup
Flammable Limits:	N/D
Extinguishing Media:	Dry chemical, water spray, water fog, CO_2, foam, or sand/earth
Special Firefighting Procedures:	N/D
Unusual Fire & Explosive Hazards:	N/D

SECTION 4 HEALTH HAZARD

Oral Toxicity:	Slight throat irritation and respiratory discomfort
Eye Irritation:	Slight irritation
Skin Irritation:	Mild to moderate irritation
Chronic Effects of Overexposure:	N/D
Acute Toxicological Properties:	Mild to moderate irritation

SECTION 5 EMERGENCY FIRST AID PROCEDURES

Skin:	Immediately flush with larger amounts of water for at least 15 minutes.
Eye:	Immediately flush with larger amounts of water for at least 15 minutes.
Inhalation:	Remove to fresh air. If breathing is difficult, give oxygen and call a physician.
Oral:	If swallowed, call a physician.
Ventilation Procedure:	Local, mechanical, special

SECTION 6 SPECIAL PROTECTION INFORMATION

Glove Protection:	Rubber or plastic, solvent resistant
Eye Protection:	Chemical safety goggles
Other Protection:	Neoprene protective type apron

SECTION 7 PHYSICAL DATA

Vapor Pressure:	0.0 mm Hg Determined by ASTM d-323 which is method approved by CA EPA		
Vapor Density:	N/D		
Specific Gravity:	0.88	Evaporation Rate:	.0098
Water Solubility:	Emulsifies in water	Odor:	Fatty
% Volatile:	0%	Appearance:	Amber liquid
pH:	5-7	Form:	Liquid

SECTION 8 STABILITY

Stability:	The product is stable under normal conditions.
Incompatibility:	Keep away from strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.
Polymerization:	Not applicable.
Thermal Decomposition:	Carbon monoxide and carbon dioxide from burning.

SECTION 9 SPILL OR LEAK PROCEDURES

Spill Procedure:	Absorb with an inert material such as sand or vermiculite; sweep up and dispose in accordance with federal, state, and local regulations.
Waste Disposal:	Dispose of in accordance with federal, state, and local regulations.

SECTION 10 SPECIAL PRECAUTIONS

Special Precautions: Precautions to be taken in handling and storage. Store between 40° - 120° F.

SECTION 11 TRANSPORTATION & LABELING

DOT Proper Shipping Name:	Methyl Soyate, emulsified.
DOT Hazard Class:	Not regulated.

SECTION 12 OTHER REGULATORY INFORMATION

Section 313 (Title III Superfund Amendment and Reauthorization Act)

THIS PRODUCT DOES NOT CONTAIN ANY CHEMICAL SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

THIS PRODUCT MEETS CALIFORNIA B.A.C.T. REQUIREMENTS OF 0.2 MM HG VAPOR PRESSURE.

SOYSOLV® II Plus

MATERIAL SAFETY DATA SHEET

SECTION 1 MATERIAL IDENTIFICATION

Product Name: SOYsolv II Plus
Revision Date: 3/24/00
Chemical Name: Ethyl Hydroxy Propionate/
Fatty Acid Methyl Esters
DOT Classification: Compound Cleaning Liquid N.O.S. UN NA 1993

SOYsolv®
6154 N CR 33
Tiffin OH 44883
Emergency Phone #: 800-231-4274

800-231-4274
e-mail: sales@soysolv.com
www.soysolv.com

Formula: Blend

SECTION 2 HAZARDOUS INGREDIENTS

Chemical/Common Name	Percent	CAS NO.	Applicable PEL-OSHA	Exposure Limits TLV-ACGIH
Ethyl Lactate	10-90	97-64-3	none	none
Methyl Soyate	10-90	67784-80-9		

SECTION 3 HEALTH HAZARD DATA

Acute Health Effects:
Eyes: Risk of damage
Skin Contact: Not an irritant
Ingestion:
Inhalation: Possible narcotic effects at excessive exposure

Chronic Health Effects: None known; not listed as a carcinogen

Routes of Entry: Most common – skin and inhalation

Medical Conditions Aggravated by Exposure: Mist may cause eye/respiratory irritation with coughing

SECTION 4 FIRST AID MEASURES

Eyes: Immediately flush with water for at least 15 minutes. See a medical doctor immediately.
Skin: Rinse with water
Inhalation: Remove to fresh air. If discomfort occurs and persists, obtain medical attention.
Ingestion: Induce vomiting. See a doctor immediately.

SECTION 5 FIRE FIGHTING MEASURES

Extinguishing Media: Water, water fog, carbon dioxide (CO_2), dry chemical
Special Procedures: Wear NIOSH approved respirator
Degree of Fire and Explosion Hazard: Moderate. Rags soaked with any solvent can present a fire hazard and should be stored in UL listed or Factory Mutual approved, covered containers. Improperly stored rags, under Certain conditions can lead to spontaneous combustion.
Hazardous Decom-Position Procedures: None. Decomposes to water and CO_2 when completely combusted.

SECTION 6 ACCIDENTAL RELEASE/SPILL MEASURES

Procedure for Release or Spill: Cover with large quantity of absorbent material (e.g. kitty litter) and collect in drums for disposal. Clean contaminated area with water and discharge to sewer.

SECTION 7 CHEMICAL AND PHYSICAL DATA

Melting Point:	not applicable	Specific Gravity (H_2O=1):	0.946
Boiling Point:	292° F	Percent volatile by volume (%):	55
Vapor Pressure (mmHg):	0.9 @ 68° F	Evaporation rate (butyl acetate=1):	0.12
Vapor Density (air=1):	4.1	pH of water dispersion:	6.9
Flash Point (method used): ASTM D93, closed cup	150° F	Appearance and Odor:	Clear colorless to light yellow liquid; mild odor
Flammable limits @ 212° F:	Lel – no data Uel – No data		
Extinguishing Media:	water, foam, CO_2	Odor Threshold:	no data
Special Fire Fighting Proc:	not required		
Incompatibility (materials to avoid):	none	Partition coefficient:	n-octanol/water – not applicable
		Autoignition Temperature:	no data
Hazardous decomposition Products:	none	Explosive Properties:	not applicable
		Oxidizing Properties:	not applicable

SECTION 8 STABILITY AND REACTIVITY DATA

Stability:	stable
Hazardous Polymerization:	none known
Conditions to Avoid:	none known
Materials to Avoid:	strong oxidizing agents
Major Contaminants that Contribute to Instability:	none
Incompatibility:	none known
Hazardous Decomposition Products:	none
Sensitivity to Mech. Impact:	none
Sensitivity to Static Discharge:	none

SECTION 9 TOXICOLOGICAL INFORMATION

Eye Contact:	irritant
Skin Contact:	LD 50 (rats/24 hrs.) >2000mg/kg
Skin Absorption:	no data available
Inhalation:	LC 50 (rat/4 hrs.) > 5400 mg/m^3
Ingestion:	LD 50 > 4090 mg/kg (rat) (RTECS 1985-86)
Acute Effects from Overexposure:	may cause irritation of the eyes
Chronic Effects from Overexposure:	none identified

(effects considered include: sensitivities, carcinogenicity, teratogenicity, mutagenicity, synergistic, products, and any medical conditions generally recognized as being aggravated by exposure)

SECTION 10 ECOLOGICAL INFORMATION

Environmental Fate:	100% biodegradable
Environmental Effects:	No adverse effects known or suspected. Not listed toxic chemical under SARA Title 111.302, 304 or 313

SECTION 11 HANDLING AND STORAGE

Handling:	Keep container tightly closed. Store in a cool, dry, well-ventilated, liquid storage area.
Ventilation:	Use adequate general or local exhaust ventilation to keep vapor and mist levels as low as possible.
Storage:	Store in a cool, dry area away from acids.

SECTION 12 EXPOSURE CONTROL/PERSONAL PROTECTION

Recommended Personal Protective Equipment:	
Respiratory:	None required where adequate ventilation conditions exist.
Ventilation:	
(Local Exhaust):	recommended
(Mechanical – general):	general dilution
Eye Protection:	Use chemical goggles
Gloves:	Use impervious gloves to prevent skin contact.
Special Clothing and Equipment:	Aprons recommended. If clothing becomes contaminated, remove and launder before reuse.
Other Protective Equipment:	none identified
Foot Protection:	industrial safety shoes
Other Engineering Controls:	none identified
Work Practices:	Do not smoke in areas of storage or use. Avoid all contact with skin and eyes.
Control Measures:	Minimize eye and skin contact by using appropriate protective equipment. Use local or general room ventilation to control vapors or mist that may be generated into the work environment.

SECTION 13 SPECIAL PRECAUTIONS DATA

Precautions to be Taken in Handling and Storing – Avoid all contact with eyes or skin. Wear the appropriate protective equipment. Protect containers from physical damage.

Maintenance Personnel – Wash down vessels. Check the oxygen and combustible vapor content of the vessel atmosphere. Use the appropriate protective equipment.

SECTION 14 DISPOSAL PROCEDURES

Waste Disposal Method:	Take up with sand or other non-combustible absorbent material and place into container for later disposal. Flush area with water. Dispose in accordance with all applicable Federal, State and local environmental regulations.

SECTION 15 TRANSPORT INFORMATION

DOT Proper Shipping Name:	Compound Cleaning Liquid, N.O.S.
IATA:	not applicable
IMDG:	Class 3.3
DOT Classification:	Combustible Liquid N.O.S.
DOT Labels:	Flammable Liquid, 3
DOT Marking:	not applicable
DOT Placard:	bulk: flammable liquid; no placard required under 110 gal.
UN Number:	NA 1993, PG III
Hazardous Substance/RQ:	not applicable
49 STCC Number:	not applicable
Precautions To Be Taken in Transport:	none needed
Other Shipping Information:	none

SECTION 16 REGULATORY INFORMATION

OSHA Exposure Limits Substance(s):	Ethyl Lactate
OSHA PEL-TWA:	not applicable
STEL:	not applicable
Ceiling:	not applicable
Skin Designation:	not applicable
AGGIH TLV-TWA:	not applicable
STEL:	not applicable
Ceiling:	not applicable
Skin Designation:	not applicable
Target Organ Effects:	Eye
Carcinogenic Potential:	none
Regulated by OSHA:	no
Listed on NTP Report:	no
IARC Group 1, 2A, 2D:	no
US EPA Requirements Release Reporting CERCLA:	
(40 CFR 302):	
Listed Substances:	not listed
RQ:	not applicable
Category:	not applicable
RCRA Waste No.:	not applicable
Unlisted Substances:	not applicable
RQ:	not applicable
Characteristic:	not applicable
RCRA Waste No.:	not applicable
SARA Title III Sec 313 (40 CFR 372):	
Listed Toxic Chemical:	not listed
Inventory Reporting SARA Title III Sec 311/312:	
(40 CFR 370):	
Substance(s):	
Hazard Category:	
Planning threshold:	
Emergency Planning:	
SARA Title III Sec 302-303 (40 CFR 355):	
Listed Substances:	not applicable
RQ:	not applicable
Planning Threshold:	not applicable
US TSCA Status:	listed
Canada Ingredient Disclosure List Substance(s):	
Controlled Product:	
Hazard Symbols:	
Class and Division:	
Product Identification No.:	
Domestic Substance List:	
CEPA Priority List:	
Carcinogenicity:	not listed in other OSHA, ACGIH, NTP, or IARC
ACGIH Appendix A:	not listed
A1 – Confirmed Human:	not listed
A! – Suspected Human:	not listed
IARC Group 1 or 2:	no
Label Language (US/Canada) Health:	not applicable
Physical Handling and Storage:	Keep container tightly closed. Store in a cool, dry, well-ventilated liquid storage area.
First Aid:	In case of contact, immediately flush eyes with water for at least 15 minutes. If irritation persists, obtain medical attention. Flush skin with water.
State Regulations:	

SECTION 17 ADDITIONAL INFORMATION

OSHA permissible exposure limit or ACGIH threshold limit value has not been established.

SECTION 18 HMIS LABEL

HEALTH:	1
FLAMMABILITY:	2
REACTIVITY:	0
PERSONAL PROTECTION:	B

DEPARTMENT OF TRANSPORTATION

Hazardous Materials Regulations, 49 CFR

Proper Shipping Name:	Compound Cleaning Liquid, N.O.S.
Hazard Class:	3
Packaging Group:	III
Reportable Quantity:	None
Label Required (drums):	None
Placard Required (Bulk):	Placard flammable liquid
Maximum Quantity – Aircraft:	No limit
Stowage on vessels:	Above or Below Deck

MATERIAL SAFETY DATA SHEET

MANUFACTURER:

Emerald Edge Environmental, Inc.
1312 FM 646 Suite 6, Dickinson, Texas 77539
EMERGENCY PHONE 281-614-0180

SECTION I: IDENTIFICATION

PRODUCT: GoldSolv
DESCRIPTION: Organic Industrial Solvent

SECTION II: INGREDIENTS AND HAZARDOUS CLASSIFICATION

NO HAZARDOUS COMPONENTS
(Federal OSHA Hazard Communication Standard 29 CFR 1910.1200)
All Ingredients are Organic and 100% Biodegradable

SARA HAZARD: TITLE III SECTION 313 – Not Listed FIRE (Section 311/312): None Listed

SECTION III: HEALTH INFORMATION

INHALATION: No known effects
INGESTION: Considered non-toxic (16 CFR 1500 3 Code of Federal Regulations 16 Federal Hazardous Substances Act Regulations Part 1500 3), however as with any cleaner, avoid ingestion.
EYE CONTACT: Mild transient discomfort and irritation. Avoid contact.
SKIN CONTACT: Non-corrosive and non-irritating to normal skin upon incidental contact, however, always rinse with clean water after each contact.

EFFECTS OF OVEREXPOSURE:

INHALATION: No negative effects likely with normal ventilation
INGESTION: Mild transient gastrointestinal irritation
EYES: Mild transient dryness.
SKIN: Extended contact causes depletion of skin oils resulting in dryness/irritation

SECTION IV: OCCUPATIONAL EXPOSURE LIMITS

PEL: No OSHA PEL
TLV: No ACHIH TLV

SECTION V: EMERGENCY FIRST AID PROCEDURES

INHALTION: Not a known problem, however, if problems develop remove to fresh air
INGESTION: Call physician or poison control center if swallowing is suspected.
SKIN: Wash affected area with water , reduce or discontinue contact.
EYES: Flush with plenty of water. If irritation persists, contact physician.

SECTION VI: PHYSICAL DATA:

Boiling Point: > 200 degrees F. Vapor Pressure: MM/HG: < 5 @ 70 degrees F.
Vapor Density: Specific Gravity: 1.00 +/- .01 Evaporation Rate: =H20
Solubility in Water: Fully miscible Odor: Slight Fatty Scent
Appearance: Slightly viscous liquid Color: Gold/Amber
pH: approx. 7.7
GoldSolv MSDS (con't) Page 2 of 2

SECTION VII: FIRE AND EXPLOSION HAZARDS

Flash Point: 212 degrees F. (CC)
Volatile Organic Compounds (VOC'S): None
Extinguishing Media: Water/CO2 /Foam
Special Fire Fighting Procedures: None
Unusual Fire/Explosion Hazards: Soaked rags/sponges should be stored in UL approved covered containers.
NFPA Rating: 1/1/0/0

SECTION VIII: REACTIVITY DATA

Stability: Stable
Materials to Avoid: Strong oxidizers, acids, alkalis
Conditions to avoid: None
Hazardous Decomposition Products: None

SECTION IX: EMPLOYEE PROTECTION

Control Measures: Provide normal indoor/outdoor exchange ventilation
Respiratory Protection: Respirators normally not required
Protective Clothing: Impervious gloves
Eye Protection: Safety glasses/goggles recommended
HMIS III Rating: 1/0/0/B (0 =Minimal 1 = Sight 2 =Moderate 3 =Serious 4 = Severe)
(B = Safety Glasses/Goggles/Gloves)

SECTION X: ENVIRONMENTAL PROTECTION

Special Precautions: Avoid release; containment measures should be implemented.
Spill or leak Precautions: Contain and secure. If not possible, rinse/dilute with plenty of water
Waste Disposal: No known negative impact would be expected if released in diluted form, however, any disposal must be in accordance with all local state and federal laws.

SECTION XI: TRANSPORTATION REGULATORY CONTROLS

DOT Classification: Class 55
Proper Shipping Name: Cleaning compound
Other Requirements: None
Hazard/Placard: None Required

THIS INFORMATION RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED & MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY OTHER PROCESS. THE STATED M.S.D.S. IS RELIABLE TO THE BEST OF THE COMPANY'S KNOWLEDGE & BELIEVED TO BE ACCURATE AS OF THE DATE

INDICATED. HOWEVER, NO REPRESENTATION, WARRANTY OR GUARANTEE OF ANY KIND, EXPRESSED OR IMPLIED, IS MADE AS TO ITS ACCURACY, RELIABILITY OR COMPLETENESS & WE ASSUME NO RESPONSIBILITY FOR ANY LOSS, DAMAGE OR EXPENSE, DIRECT OR CONSEQUENTIAL, ARISING OUT OF USE. IT IS THE USER'S RESPONSIBILITY TO SATISFY HIMSELF OR HERSELF AS TO THE SUITABLENESS & COMPLETENESS OF SUCH INFORMATION FOR HIS OR HER OWN PARTICULAR USE.

Date prepared: 9/30/04
Symbols: NA=Not Applicable F=Fahrenheit C=Centigrade

UNITED 399

UNITED LABORATORIES

MATERIAL SAFETY DATA SHEET

320 37th Avenue • St. Charles, Illinois 60174 • To Reorder, Call 800-323-2594

PRODUCT IDENTIFICATION	USE / DESCRIPTION	REVISION DATE	FOR MEDICAL AND TRANSPORTATION EMERGENCIES: INFOTRAC: 800-535-5053
UNITED 399	Non-Emulsifiable Tar Remover and Degreaser	August 10, 2007	

HEALTH (0 = Maximum Safety) 2

Always follow Label Directions and Cautions.

4 Extreme. 3 High. 2 Moderate. 1 Slight. 0 Minimal.

See Health Hazard Data Section of this M.S.D.S. for more detailed information.

FLAMMABILITY (0 = Maximum Safety) 2

Susceptibility of Material to Burning.

4 Extremely flammable.
3 Ignites at normal temperature.
2 Ignites when moderately heated.
1 Must be preheated to burn.
0 Will not burn.

REACTIVITY (0 = Maximum Safety) 0

Susceptible to Release of Energy.

4 May detonate-vacate area if Materials are exposed to fire.
3 Strong shock of heat may detonate-use monitors from behind explosion resistant barriers.
2 Violent chemical change possible-use hose stream from distance
1 Unstable if heated-use precaution.
0 Normally stable.

PERSONAL PROTECTION

HAZARDOUS COMPONENTS
IDENTITY, EXPOSURE LIMITS AND S.A.R.A. TITLE III INFORMATION

HAZARDOUS COMPONENTS	CAS NUMBER	ACGIH TWA	ACGIH STEL	OSHA PEL	OTHER RECOMMENDED LIMITS	S.A.R.A. TITLE III QUANTITIES
d-1,8(9)-p-menthadiene	5989-27-5	Not established	Not established	Not established	None	None

PHYSICAL / CHEMICAL CHARACTERISTICS

BOILING POINT 347°F	**SPECIFIC GRAVITY (H2O = 1)** 0.840
VAPOR PRESSURE (mm Hg.) (At 77° F) Approximately 1.0	**MELTING POINT** Not determined
VAPOR DENSITY (Air = 1) 4.7	**EVAPORATION RATE** (Butyl Acetate = 1) Less than 1.0
SOLUBILITY IN WATER Insoluble	**VOLATILE ORGANIC COMPOUNDS (V.O.C.)** (Pounds Per Gallon Of Product) 7.0
APPEARANCE AND ODOR Clear, orange-colored liquid with citrus odor.	**pH:** Not applicable

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	FLAMMABLE LIMITS	LEL	UEL
115 - 125°F. (Tag Closed Cup)	At 300°F	0.7%	6.1%

EXTINGUISHING MEDIA

Dry chemical, foam, or carbon dioxide. Do not use water except as a mist or foam, as it may spread the burning liquid.

SPECIAL FIRE FIGHTING PROCEDURES

Evacuate area of unprotected personnel. Firefighters should wear protective equipment and NIOSH-approved self-contained breathing apparatus.

Cool fire-exposed containers with water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Rags soaked with this product may spontaneously ignite; to avoid this danger, used rags should be soaked with water and/or stored in a container full of soapy water. In a fire, closed containers of this product may burst or rupture due to pressure build-up, greatly increasing the fire hazard.

REACTIVITY DATA

STABILITY: STABLE [X] UNSTABLE [ ]

CONDITIONS TO AVOID
None known

INCOMPATIBILITY (Materials To Avoid)
Avoid contact with strong acids and oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY PRODUCTS
When ignited, as in a fire, this product produces carbon monoxide and carbon dioxide.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR [X] MAY OCCUR [ ]

CONDITIONS TO AVOID
None known

HEALTH HAZARD DATA

HEALTH HAZARDS
EYES: May cause irritation. SKIN: Prolonged or repeated exposure can remove natural skin oils and may produce irritation. Some individuals may develop a rash or allergic reaction after prolonged skin contact. INHALATION: Breathing fumes may irritate nose, throat, lungs and may cause nausea.
IF SWALLOWED: Swallowing large amounts, more than a few ounces, may cause nausea, upset stomach and vomiting.

CARCINOGENICITY: NTP? No IARC MONOGRAPHS? No OSHA REGULATED? No

This product contains a chemical known to the state of California to cause cancer or reproductive toxicity? No

SIGNS AND SYMPTOMS OF OVEREXPOSURE
EYES: Irritation. SKIN: Irritation, rash or allergic reaction. INHALATION: Irritation of the nose, throat and lungs and nausea.

IF SWALLOWED: Nausea, upset stomach and vomiting.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY OVEREXPOSURE
Dermatitis

TARGET ORGANS:
Eyes and skin

EMERGENCY AND FIRST AID PROCEDURE
EYES: Flush with plenty of cool water for at least 15 minutes and call a physician or poison center.

SKIN: Wash with soap and water; if irritation persists, call a physician or poison center.
IF INHALED: Remove to fresh air. Apply CPR if needed. Call a physician or poison center immediately.

IF SWALLOWED: DO NOT induce vomiting. Call a physician or poison center immediately.

PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Eliminate all sources of ignition. Ventilate area. Absorb on inert, non-combustible material and place in suitable container for disposal.

WASTE DISPOSAL METHOD
Consult your local, state, and federal officials for proper disposal guidelines.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep this product in properly labeled, tightly closed containers. Store in a cool, well-ventilated area, away from sources of ignition. Keep out of reach of children.

CONTROL MEASURES
FOR USE WHERE SIGNIFICANT EYE, SKIN OR INHALATION EXPOSURE IS LIKELY

RESPIRATORY PROTECTION (Specify Type)
IF TLV is exceeded, use NIOSH-approved respirator for organic vapors.

VENTILATION: MECHANICAL (General): Provide adequate ventilation; LOCAL EXHAUST: Provide adequate ventilation

PROTECTIVE GLOVES
Nitrile rubber, butyl rubber or PVA

EYE PROTECTION
Safety goggles

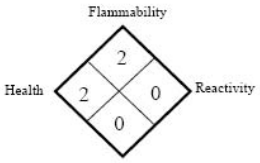
OTHER PROTECTIVE CLOTHING OR EQUIPMENT
Shirts with long sleeves are recommended.

WORK HYGENIC PRACTICES
Remove contaminated clothing immediately; wash thoroughly with soap before reusing. Wash hands and face with soap and water after using this product.

WALTER Surface Technologies

MATERIAL SAFETY DATA SHEET
L-120E

NFPA Hazard Rating



0 = Minimum 1 = Light 2 = Moderate 3 = Serious 4 = Extreme

Section 1 - Product Identification

J. WALTER INC.
810 Day Hill Road
Windsor, CT 06095

Emergency: INFOTRAC (800) 535-5053

Trade name: **Bio Clean**
Product name: Natural cleaner / degreaser
Starting with batch W06051
Order no.: 53-G 513, 53-G 516, 53-G 517, 53-G 518
WHMIS Classification: D2B, B3
Controlled under WHMIS: Yes

Section 2 - Hazardous Ingredients

Ingredients	CAS Number	% by Weight	LD_{50}RAT	LC_{50}RAT
Orange terpenes	5989-27-5	55 - 65	4.4 g/kg	N/Av
Ethyl Lactate	97-64-3	35 - 45	2500 mg/kg	5400 mg/m^3 for 8 hours

Section 3 - Physical / Chemical Characteristics

Physical state: Liquid
pH: N/A
Specific gravity: Approx. 0.90 g/ml
Evaporation rate: N/Av
Odor & appearance: Light, citrus
Boiling point: 125°C
Vapor pressure: N/Av
VOC g/l: 900 g/l
Odor threshold: None
Freezing point: -20°C
Vapor density: N/Av
Water solubility: Insoluble

Section 4 - Fire & Explosion Hazard

Flammability: Yes ***Conditions:*** *All heat sources*
Flashpoint: 45°C, c.c.
Auto ignition temperature: 400°C for ethyl lactate
Flammable limits (%): Upper: 6,1 at 150°C Lower: 0,7 at 150°C for terpene
Extinguishing media: Foam, dry powder, CO_2.
Hazardous combustion products: Carbon oxides
Sensitivity to mechanical impact or static discharge: N/Av

Section 5 - Reactivity Data

Chemical stability: Yes ***Conditions:*** *None*
Reactivity conditions: Source of heat.
Incompatible substances: Reaction with strong oxidizers.
Hazardous decomposition products: Carbon oxides

N/A - Not Applicable **N/Av - Not Available**

WALTER Surface Technologies

MATERIAL SAFETY DATA SHEET
L-120E

Section 6 - Toxicological Data

Route of entry: Eyes and skin contact, inhalation, ingestion.
Acute exposure effects: Eyes and skin irritant.
Chronic exposure effects: No known effects.
Exposure limits (TLV/TWA): N/Av

Carcinogenicity	Mutagenicity	Reproductive toxicity	Teratogenicity	Synergistic effects
No	No	No	No	No

If yes to any of the above, specify:

Section 7 - Preventive Measures

Protective equipment: Eyewear, clothing, gloves.
Handling procedures: Keep away from ignition source.
Waste disposal methods: Dispose as per local, state and federal regulations.
Leak/spill procedures: Danger! Slippery! Pick up the product using protective equipment.
Storage requirements: Store between 20º-25ºC, away from oxidizers.
Engineering controls: Ensure adequate ventilation.
Handling equipment: None
Special shipping information: UN 1993, Class 3, P.G. III, flammable liquid.

Section 8 - First Aid Measures

Skin contact: Rinse immediately with plenty of warm water for at least 15 minutes.
Eye contact: Rinse immediately with plenty of warm water for at least 15 minutes.
Inhalation: Remove victim to fresh air.
Ingestion: Do not induce vomiting. Consult a physician immediately.
Other: Remove contaminated clothing and wash before reusing. In all cases, consult a physician.

Section 9 - Preparation of MSDS

Prepared by: Chemical Tools Manager
Telephone: (860) 298-1100
Date: May 1, 2008

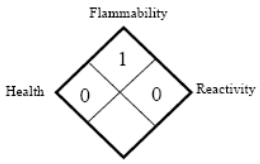
This data is offered in good faith as typical values and not as a product specification. No warranty, either express or implied is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

N/A - Not Applicable **N/Av - Not Available**

WALTER Surface Technologies

MATERIAL SAFETY DATA SHEET
L-74E

NFPA Hazard Rating



0 = Minimum 1 = Light 2 = Moderate 3 = Serious 4 = Extreme

Section 1 - Product Identification

J. WALTER INC.
810 Day Hill Road
Windsor, CT 06095

Emergency: INFOTRAC (800) 535-5053

Trade name: **X-Force**
Product name: Universal cleaner/lubricant
Order no.: 53-X 003, 53-X 006, 53-X 007, 53-X 008
WHMIS Classification: Non-hazardous
Controlled under WHMIS: No

Section 2 - Hazardous Ingredients

Ingredients	CAS Number	% by Weight	LD_{50}RAT	LC_{50}RAT

No hazardous substances to declare.

Section 3 - Physical / Chemical Characteristics

Physical state:	Liquid	**Odor & appearance:**	Clear, vanilla odor	**Odor threshold:**	N/Av
pH:	N/A	**Boiling point:**	> 260°C	**Freezing point:**	0°C
Specific gravity:	0.81 g/ml @ 15°C	**Vapor pressure:**	N/Av	**Vapor density:**	N/A
Evaporation rate:	N/A	**VOC g/l:**	N/Av	**Water solubility:**	Non-soluble

Section 4 - Fire & Explosion Hazard

Flammability: No ***Conditions:*** *Flammable if sprayed or misted.*
Flashpoint: 130°C, c.c.
Auto ignition temperature: N/A
Flammable limits (%): Upper: N/A Lower: N/A
Extinguishing media: Foam, dry powder, CO_2.
Hazardous combustion products: Carbon monoxide
Sensitivity to mechanical impact or static discharge: N/A

Section 5 - Reactivity Data

Chemical stability: Yes ***Conditions:*** *None*
Reactivity conditions: N/A
Incompatible substances: N/A
Hazardous decomposition products: N/A

N/A - Not Applicable **N/Av - Not Available**

WALTER Surface Technologies

MATERIAL SAFETY DATA SHEET
L-74E

Section 6 - Toxicological Data

Route of entry: Eye and skin contact, inhalation, ingestion.
Acute exposure effects: No known effect.
Chronic exposure effects: No known effect.
Exposure limits (TLV/TWA): N/A

Carcinogenicity	Mutagenicity	Reproductive toxicity	Teratogenicity	Synergistic effects
No	No	No	No	No

If yes to any of the above, specify:

Section 7 - Preventive Measures

Protective equipment: Eyewear. Breathing mask if used as a very fine mist. Forms slippery surfaces with water.
Handling procedures: Keep containers tightly closed.
Waste disposal methods: Dispose as per municipal, provincial and federal regulations.
Leak/spill procedures: Soak up with absorbent material, place in approved containers.
Storage requirements: Store between 0-50°C (below 0°C, the flowability property will decrease rapidly).
Engineering controls: N/A
Handling equipment: N/A
Special shipping information: N/A

Section 8 - First Aid Measures

Skin contact: Rinse with water until product is completely removed.
Eye contact: Rinse eyes thoroughly with water for 15 minutes.
Inhalation: N/A
Ingestion: Do not induce vomiting. Take approximately 5-10g of edible oil and eut. Animal charcoal. Consult a physician if necessary.
Other: Consult a physician if necessary.

Section 9 - Preparation of MSDS

Prepared by: Chemical Tools Manager
Telephone: (860) 298-1100
Date: May 1, 2008

This data is offered in good faith as typical values and not as a product specification. No warranty, either express or implied is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

N/A - Not Applicable **N/Av - Not Available**

Appendix C: Photographic Results of the Coupon Studies

Coupon preparation

Figure C1. Coupon as received.

Figure C2. Coated coupon.

Figure C3. Asphalt drying after coating.

Solvent system evaluation

Figure C4. Lip at bottom.

Figure C5. Diesel.

Figure C6. Bioclean; residue without water rinse.

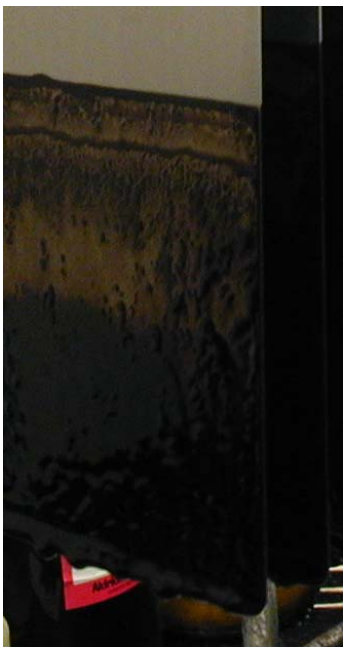


Figure C7. X-Force.

Figure C8. Bioclean coupon— ridge removed before solvent dip: Note flash rust.

Figure C9. X-Force.

Figure C10. Axarel 32.

Figure C11. Bio T Max.

Figure C12. Diesel.

Note lack of lip after modified protocol. The water rinse also helps remove residue. (Compare Bioclean with original and modified protocol.)

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
17-04-2009	Final	

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Environmentally Friendly Cleaners for Removing Tar from Metal Surfaces

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT

6. AUTHOR(S)
Joyce C. Baird, Veera M. Boddu, Pam Khabra, and Wayne Ziegler

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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Construction Engineering Research Laboratory (CERL)
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Adelphi, MD 20783-1197

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Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

As part of its mission, the Sustainable Painting Operations for the Total Army (SPOTA) working group evaluated solvents that will not impact the environment while cleaning armament equipment, in particular ground vehicles. ERDC-CERL researchers, in support of the SPOTA program, were tasked with conducting a preliminary study and develop a methodology to evaluate environmentally friendly cleaners that would be effective in cleaning road tar on military vehicles. The study involved an extensive literature review of commercial environmentally friendly tar removers (both products and methodologies). Twenty six commercial tar removal products were identified as possible solvents for removing the tar stains from ground vehicles. In addition, laboratory coupon evaluations were conducted using three select commercial products. This report presents the results of the search for commercial tar removal solvent systems, and a laboratory evaluation of select solvent systems for removing tar from steel coupons.

15. SUBJECT TERMS
degreaser, cleaners, SPOTA, environmental management

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